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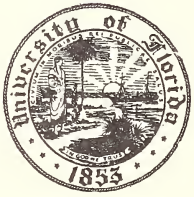
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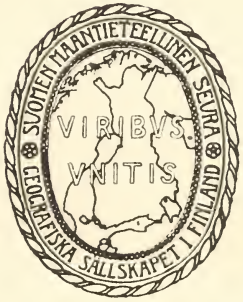


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With 342 cartograms, diagrams and photograps.

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OUTLINES OF THE GEOGRAPHY, LIFE AND CUSTOMS OF NEWFOUNDLAND-LABRADOR

(THE EASTERN PART OF THE LABRADOR PENINSULA)

BASED UPON OBSERVATIONS MADE DURING 'THE FINLAND—LABRADOR EXPEDITION' IN 1937 AND 'THE TANNER LABRADOR EXPEDITION' IN 1939 AND UPON INFORMATION AVAILABLE IN THE LITERATURE AND CARTOGRAPHY

BY

V. TANNER

WITH 342 CARTOGRAMS, DIAGRAMS AND PHOTOGRAPHS

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Prefatory notes.

This is no complete handbook of the geography of Labrador. As stated in the title, its object is limited to bringing to the notice of the somewhat scientifically trained reader some characteristics of Newfoundland-Labrador's geography. It would perhaps be more correct to call it a systematic collection of material which, after its different parts have been supplemented, will render possible a sound generalization such as ought to form a basis of a future presentation of the regional geography of that country. It has, however, seemed desirable for several reasons to publish the work now.

Speaking generally, knowledge of Labrador is still very vague and, taking into consideration even Low's valuable explorations, it is on the whole limited to the coastal areas. The shores certainly are mapped and not so little known, but travelling only some few kilometers into the interior one comes upon almost virgin country never trodden by any explorer. Only by intercourse with traders, missionaries and fishermen has one been able to obtain valuable information about these lonely »blank spots». Scientific explorers have unfortunately usually preferred to take as their object the distant arctic tracts where surveying is easier, while the sub-arctic forest lands, among them Labrador, have not roused their interest. This is partly because the penetration and surveying of these wooded areas are difficult, and partly because one cannot expect to extort from the sub-arctic forest belt any sensational records. We must, however, compel Labrador also to make its contribution to the knowledge of the geographical phenomena of our earth.

But the reasons are also of a more special nature.

When one has devoted decades to the exploration of certain phenomena within a certain area of country, some general conclusions and hypotheses crystallize out of the observations made. Even at the turn of the last century it was usual, not least in Fennoscandia, to conceive of such conclusions, deduced from concrete observations and whose validity could not be disproved by current scientific arguments, not only as the last word of science, but indeed as obvious truth. However, in north-west Europe the history of geology has many instances of such 'obvious truths' only some years or decades later being proved false conclusions. The knowledge of this urges us, in our

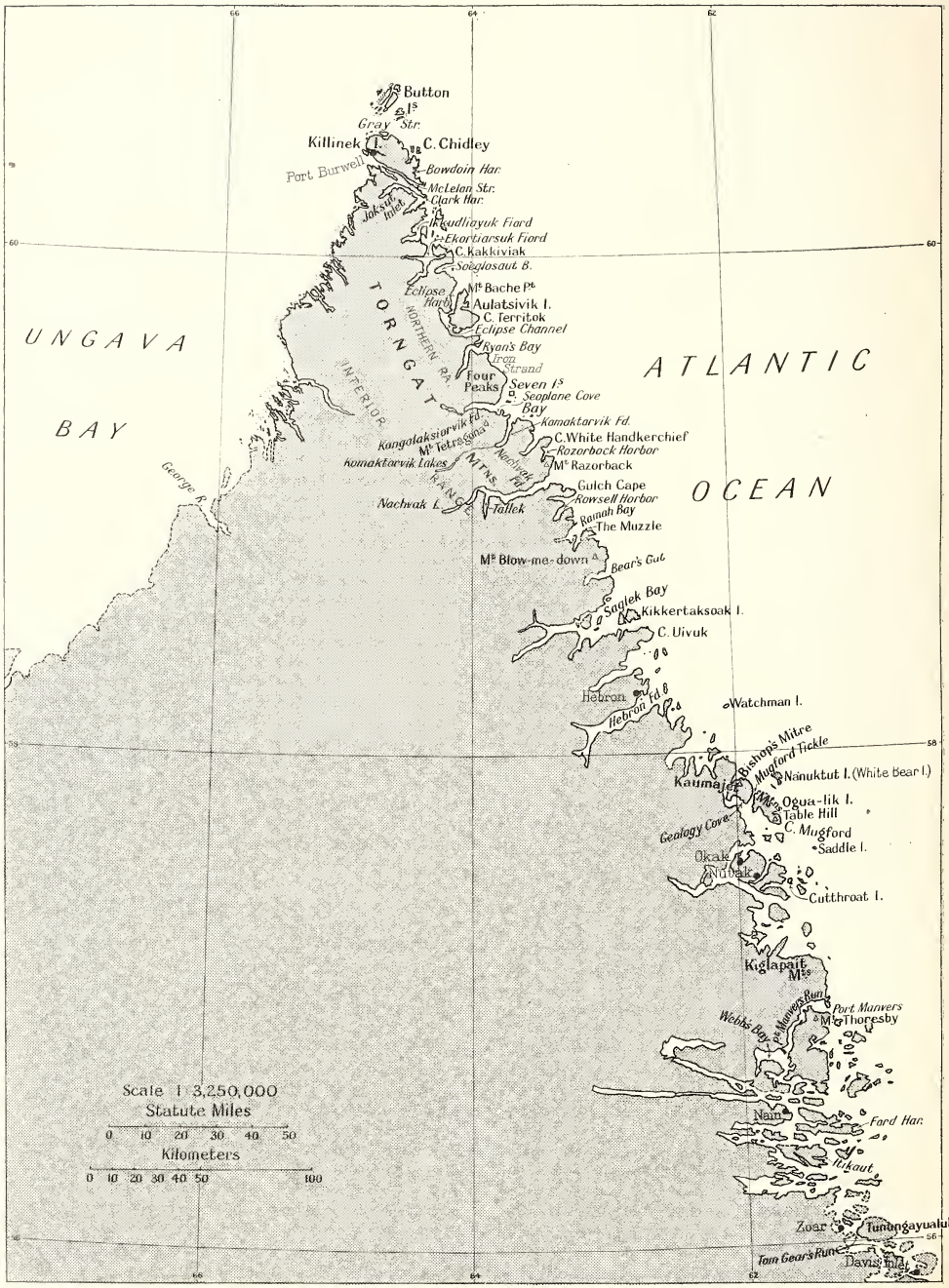


Fig. 1. Location map of the Newfoundland-Labrador coast, northern section. Compiled from Map of Northernmost Labrador drawn by the American Geographical Society, British Admiralty chart No. 265, maps of Department of Interior, Canada, and maps by E. P. Wheeler, 2 nd By courtesy of the American Geographical Society.



Fig. 2. Location map of the Newfoundland-Labrador coast, southern section. Compiled from British Admiralty charts Nos. 263 and 375, Map of Newfoundland compiled by Forest Engineering Dept., International Paper Co., 1932, and sketches from air photographs at the American Geographical Society. By courtesy of the AMERICAN GEOGRAPHICAL SOCIETY.

time, to be cautious in generalizing. A conclusion, having apparently general validity, must be tested under similar but somewhat divergent conditions in different parts of the earth's surface, and only when it has proved to be completely applicable in all of them, may it be incorporated amongst adequate scientific tenets.

This is why the author directed his glances towards Labrador. It has long been known that the natural conditions in Fennoscandia agree in some particulars with those of Laurentia. Research has noticed certain agreements of a special geological nature between the Baltic Shield on the one hand and the Laurentic Shield on the other. Facts which came



Fig. 3. *'The Finland Labrador Expedition'* of 1937. From the left E. H. Kranck, V. Tanner and I. Hustich.

to light earlier have even given cause to assume that Labrador passed in a wider sense through the same geological phases as Fennoscandian countries, and this was the starting-point for the expeditions from Finland to that country in 1937 and 1939. By a thorough study partly of the pre-Cambrian and partly the late-Quaternary geology of Labrador it should be possible to collect the premises necessary to compare and finally link up the synchronous formations of the Old and New Worlds. But, of course, one should be able to verify in Labrador the correctness of other scientific working hypotheses too, such as have been developed lately, especially in Finland.

This was the chief reason why in 1937 a scientific party, The Finland-Labrador Expedition, started out from Finland to the eastern parts of the Labrador peninsula. The leader of this expedition and its Quaternary

geologist and geographer was the author of these lines, Professor in Geography at the University of Helsingfors. The others who took part were Dr. E. H. KRANCK, pre-Cambrian geologist and geographer, teacher of geology at the same University and Professor in Economic Geography at Svenska Handels-



Fig. 4. *'The Tanner Labrador Expedition'* of 1939 on board the S/S *'Strathcona'*. Uppermost row from the left: JOHN FAYERWEATHER, CARL-GÖSTA WENNER. Second row: DAVID B. STEWART (doctor), JIM STYLES (stoker) and GEORGE L. PEABODY. Third row: WILL SIMMS (captain); JAMES STYLES (engineer); JOHN SIMMS (cook) and HENRY H. ANDERSON J:r. Lowest row: ALEXANDER FORBES, V. TANNER, PETER GILMAN and JOHN NASH.

högskolan in Helsingfors, and the botanist, Dr. I. HUSTICH from Helsingfors; cf. Fig. 3. The expedition was in the first place to undertake geological and botanical studies, but also to devote attention to geographical conditions in

a wider sense. The main object was to attempt to reach an exact connection between the oldest and between the youngest geological formations in the north-eastern North America and north-westernmost Europe. If the expedition succeeded in realizing this, the result would not only considerably extend our knowledge of Labrador's geological structure, but would produce main lines of conclusion of the most general and widest importance for several branches of natural science and archeology. To this I shall return later.

With the help of the literature available in Finland, those who took part in the 1937 expedition had endeavoured to learn previously something of the geographical conditions of Labrador. But after even only a few days confrontation with reality, it was clear that many of the conceptions formed regarding natural conditions and the inhabitants were incomplete or incorrect and that in many cases our knowledge had to be fundamentally revised. We soon realised too why American explorers probably had shown so little interest in the country: the lack of maps and the difficulty of travelling in the dense virgin forests where the sight in many places was restricted to only a few meters ahead. The work progressed extremely slowly. Fennoscandia's explorers are, however, not in the habit of giving way when faced by difficulties. Two new expeditions continued the work.

In 1939 the Quaternary geological and geographical investigations were continued by The Tanner Labrador Expedition of which the author was the leader, geologist and geographer. Dr. Alexander Forbes, Professor in the Harvard Medical School, the distinguished Labrador expert, also took part at the beginning of the expedition, i. a. as aviator, attracted especially by his interest in questions of colonization; in 1938 we had travelled together in Lapland and became acquainted with the solution of these questions there. Fil. lic. Carl-Gösta Wenner from Stockholm's Högskola participated as peat geologist and natural historian. The American students David B. Stewart, the expedition's doctor, and Henry H. Anderson Jr:, John Fayerweather, John Nash, George L. Peabody and Peter Gilman took part as assistants; cf. Fig. 4.

In the same year, Dr. Kranck, with the assistance of the student Oleg v. Knorring, Helsingfors, undertook a thorough examination of the rocks in the coastal districts between Battle Harbour and Nain.

Our explorations had to be suspended because the tragic world-wide conflagration broke out and Finland was one of the first victims.

The work begun in Labrador by these explorers must, of course, not be regarded as even approximately concluded. It might, on the contrary, almost be

said that we have only now come upon the tracks of the kernel of the questions and the appropriate methods. Yet, with the devastation which is overwhelming the higher culture in Europe before our eyes, it seems uncertain to what extent our exploration can ever or in an appreciable future be continued and concluded. It therefore seemed appropriate to the author to publish even in its half-completed stage the present description of the geographical conditions of Newfoundland-Labrador, in order thus to rescue at least some of the results of the expeditions while there is time. Accounts of the special topics will, I hope, gradually be published in the scientific series of Fennoscandia. The summary presented here is based chiefly on the author's and his colleagues' own observations during the expeditions. Moreover, the writer has attempted to collect the facts given by earlier visitors with scientific schooling and travellers in this region and incorporated them with our own records; cf. the annexed bibliography and the bibliographies attached to the works listed. I have presented rather in detail many of the more important notes found in the literature in the hope that later travellers may more easily add new information and correct the inaccuracies and deficiencies of the old. In other cases, in order to cut down the expenses it has been necessary to condense the account as much as possible. As regards excerpts the text has in may cases been limited to referring the reader to some special work with detailed information in the matters indicated in the text by figures in brackets and these refer to the corresponding figures in heavy type after the references in the bibliography, *viz.* in the list of the cartographical representations at the end of the book. Much that cannot find room in the closely printed pages has for the same reason been expressed by reproductions of photographs and graphic figures and drawings. A good camera from an aeroplane can furnish more information in a few hours than a party on foot can obtain in weeks or months, especially in the interior of Labrador. Our knowledge has however proved to be rather fragmentary in character; systematic observation was difficult during the rapid reconnaissances. Nor does this account claim to be exhaustive from the scientific point of view; one cannot, in a few hundred pages, describe conditions in any way satisfactorily in an area so large (c. 285,000 sq.km.), so varying and so rich in problems as Newfoundland-Labrador; every section here touched upon really demands a book to itself; cf. Figs 1 and 2. Yet, the author ventures to hope that in spite of all its shortcomings the book will to some extent inspire and facilitate the work of future explorers and in particular spare them the difficulty of working out the bibliography. In many cases it can be good to have access to a systematically elaborated framework, especially when planning fresh explorations in Labrador.

When all these remarks have been considered, the author hopes that his reader will be really indulgent. In the text certain obscurities may be easily discovered, especially in cases where the primary information forming the basis of the description has been insufficient. It may also be that minor errors have slipped in, for instance where the description has been based on information received from the local population or from the literature on Labrador, in which case the result is largely dependent on the nature of the original sources. Experience shows that verbal information must be carefully criticized and checked, and in regard to unchecked rumours Labrador is the promised land. In St. Anthony I heard in several places of a sad event in the spring of 1939 when a girl had been killed and eaten by the sledge-dogs in Cartwright. When shortly afterwards I arrived in Cartwright, there was no one who had heard of such a horrid event happening either in Cartwright or anywhere else on the Labrador coast in 1939. As regards descriptions of the ethnological phenomena, some apparent contradictions could not be avoided in spite of all possible criticism. This is due not least to the fact that the people in Labrador are at present going through a period of intensive evolution, and what is normal to-day becomes very quickly something belonging to the past. One piece of information is often in direct contradiction to another, both in literature and in different statements made by the local inhabitants, and one is often faced with the question of which is correct. In order not to render the description too cumbersome, the author has generally not entered into a discussion of every obscurity or always quoted the sources. Yet, these things need not frighten the reader, for my final judgment of the compilation on the whole is that it tends to give a fairly correct picture of the natural conditions and the life of the people of the easternmost part of the Labrador peninsula.

In conclusion, the author must express his deep gratitude for the friendliness and support which both his expeditions have received from public and private persons. First and foremost I wish to thank also publicly my old friend, Mr Georg Achates Gripenberg, the Minister of Finland in London, for all he did to persuade His Britannic Majesty's Government to open the doors of Labrador for me and my companions at a time when premonitory signs were already showing on the political horizon.

During the planning of the research work Dr Ernst Antevs procured for me the most valuable information and good advice in America, and I wish gratefully to acknowledge his helpfulness.

The expedition of 1937 was possible thanks to the generous support in different forms of the Government of Finland, the Government of New-

FOUNDLAND, the SOCIETY OF SCIENCE IN FINLAND, ELLA AND GEORG EHRNROOTH'S FOUNDATION, Helsingfors, Messrs. Kommerserådet A. GESELLIUS, Bergsrådet L. BAUMGARTNER, Bergsrådet C-G. HERLITZ, Dr. F. M. PITKÄNIEMI, Dr. HENRIK RAMSAY, Director OSKAR LINDBERG and Fil.Mag. GUNNAR VON FRENCKELL in Helsingfors.

The realization of the expedition of 1939 was chiefly due to Dr. ALEXANDER FORBES' tireless efforts and the material support which he gave in many different forms; I wish here to express my most sincere thanks to him for his good companionship and friendship during our voyages in two continents, and for his painstaking assistance and his many valuable suggestions. The expedition also received generous support from the GEOLOGICAL SOCIETY OF AMERICA, the INTERNATIONAL GRENFELL ASSOCIATION, the WENNER-GREN FOUNDATION in Stockholm, kommerserådet WALTER GREULING, Helsingfors, and Mr. JOHN LINDSLEY, Toronto.

For all this support myself and my companions are greatly indebted in regard to both expeditions. My thanks are also due to the AMERICAN GEOGRAPHICAL SOCIETY, which supported me with maps and literature and kindly gave me permission to make use of a great many pictures of Labrador in the present account.

The author also remembers with gratitude the help and hospitality received by both expeditions from the authorities of Newfoundland, from Sir WILFRED W. WOODS, K.C.M.G., Commissioner of Public Utility, Mr. D. JAMES DAVIES, C.B.E., Commissioner of the Colony in London, Dr. A. K. SNELGROVE, State Geologist and Dr. CLAUDE K. Howse. Capt. OLAV OLSEN, Finland's Consul in St. John's, I thank in the most friendly way for his assistance and great hospitality.

The expedition of 1939 is further greatly indebted to the BOARD OF DIRECTORS OF THE INTERNATIONAL GRENFELL ASSOCIATION and its representatives in Labrador, who made it possible for us to charter the S/S »*Strathcona II*» and readily facilitated the realization of my plans and in every way made our stay enjoyable: my best thanks to Dr. CURTIS in St. Anthony; the late Dr. HARRY L. PADDON will always be remembered by our company with the deepest gratitude; he not only aided our journeys along the coast, but also gave us the benefit of his many rich experiences collected during three decades spent on the coast.

I also take this opportunity of recording the great debt of gratitude which the expeditions owe to HUDSON'S BAY COMPANY'S management and officials; the kindness of Mr. BROOKS in London and Mr. PARSONS in St. John's and the sassistance and hopitality of the managers of the H. B. C. posts in Labrador

will never be forgotten. Without Mr. COBB's willing assistance in Cartwright, the 1937 expedition would have been held up for an indefinite time in need of a suitable vessel, and Mr. KEATH's help as interpreter and his knowledge of the country and its population were invaluable to me.

Our meetings with the MORAVIAN MISSION's representatives in Labrador: Messrs. the Rev. PAUL HETTASCH, Rev. H. SACH and Rev. GRUBB and their charming families, will always remain a precious memory. Unforgettable are the evenings spent with Mr. HETTASCH and his family in Nain, finding there the cheerful hearth of the harsh coast.

Nor do I ever wish to forget the other inhabitants of the country, who always received us so kindly; they showed us a gentle and a winning hospitality, difficult to describe but delightful to experience.

To Dr. J. A. RETTY, the leader of the *Labrador Mining and Exploring Company's* expedition to the interior of the peninsula in the summer of 1937 I am much indebted for the help and splendid hospitality he showed me in his cosy encampment at Sandgirt Lake.

The author would like to express his obligation also to many of his colleagues: Dr. KAJ BIRKET-SMITH, Professor EINAR G. DU RIETZ, Dr. HARALD LINDBERG, Professor OSC. V. JOHANSSON, Professor VÄINÖ AUER, Professor PONTUS PALMGREN and Professor ERIK PALMÉN who have most kindly assisted witht heir advice when discussing the ethnological, biological, oceanographical and climatological matters respectively.

When writing in a language not one's mother tongue one needs assistance. The writer wishes to offer his very sincere thanks to Miss AGNES DAWSON, M.B.E, B.Sc (Econ.), for her friendly help in the correcting of the manuscript and the proof sheets.

My thanks are none the less due to my wife who has throughout helped me with head and hand.

And finally, my warmest greetings and thanks to my companions on the journeys in Labrador. My Swedish colleague and myself were unanimous that a more superb crowd of assistants than the six American students could scarcely have been collected in Europe; Captain SIMMS and the crew of our boat carried out their duties on this difficult coast in an admirable way.

The printing of the book has been rendered possible by the financial support of the GOVERNMENT OF FINLAND, the SOHLBERG FOUNDATION OF THE SOCIETAS SCIENTIARUM FENNICA, the GEOGRAPHICAL SOCIETY OF FINLAND, the firm of E. TILGMANN, Printers, Bergsrådet L. BAUMGARTNER, O. Y. TIKKAKOSKI A.B., A. B. KEMI O. Y., SUOMEN PUUNVIENTI O. Y., O. Y.

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The main part of this treatise was written during the author's long stay at superb Stjärnvik in Sweden and he wishes once more to express his warmest thanks to his kith and kin the Major and Baroness Elisabeth Stenhammar for their marvellous hospitality.

During my journeys I found in Labrador many thoughtful and enquiring spirits. Therefore I hope that this my presentation of their own land will add

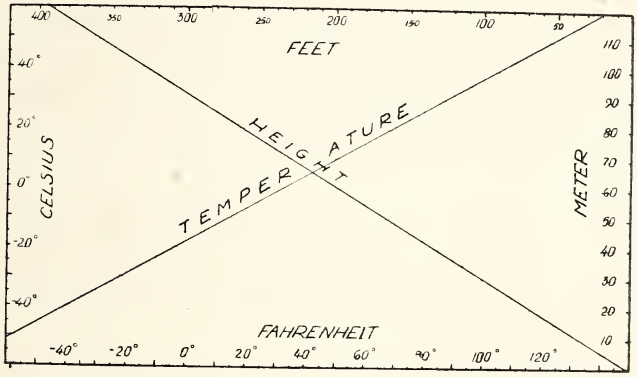


Fig. 5. Diagram for changing feet into meters and Fahrenheit degrees into Celsius and *vice-versa*.

to their joy and deepen and develop their knowledge of their community and its demands.

It would be an added joy to the writer if this account also helped to increase the flow of visitors to the fascinating Labrador. I write *the* Labrador because the Labradoreans and the Newfoundlanders always say the Labrador, the word peninsula being understood. The fishermen will *sail down to the Labrador*. This curious expression probably goes back to the days in which the North was placed on the lower part of maps, as for instance on Pierre Descelière de Arques' cartographical representation of Labrador of the year 1546. I venture to hope that after reading my book the interest and attractiveness of Labrador's natural conditions and the life and the customs of its inhabitants will be more fully understood. It is so true, as Delabarre once stated, that many visitors to Labrador return with the impression of a bleak and forbidding country, rude, cruel, unattractive, bare of vegetation. But for those who

have more observant eyes, who give themselves time to penetrate into the interior, its wealth, variety and brilliance are striking. Its peculiar natural conditions and extraordinarily winning and attractive people soon rouse deep interest in both. The times are gone when the Canadian writer CLAPIN could state: . . ., le préjugé populaire veut que le Labrador ait à ses portes comme un autre minotaure, destiné à devorer tous ceux qui se présenteront pour en scruter les secrets.

Nowhere do Europe and North America approach each other so nearly as in Labrador. Many circumstances already indicate that Labrador ought to become a scientific link between naturalists on both side of the North Atlantic. Yet this will not come about until a considerable amount of assiduous scientific work has been done on the systematic investigation of this enormous peninsula still so little known. For explorers in the new world it is especially favourably placed, and one therefore dares to hope that Labrador will become the fashion in America as a sphere of exploration, and that, by means of American efforts, we shall soon receive a more complete presentation of its geography than is now possible.

The metric system and the Celsius degrees have been used in the text in the main. The English units of measure have however been retained in the information drawn from English and American works. A diagram is included to facilitate conversion; Fig. 5.

While this book was being printed the author was for the most part abroad. When the page proofs appeared it was found that some of the sub-headings had been lost during the making up, and no space had been left for them. The reader will find them in the list of contents.

Grankulla, April 1941.

V. Tanner.

Newfoundland-Labrador designates the Eastern Part of Labrador.

The enormous Labrador peninsula (ca. 1.619,000 km^2, according to 869), which forms the large, truncated, north-easterly spur of the North Amercian continent, comprises more than one-twelfth of its total area. It has the shape of an irregular square as appears from fig. 2. There are many large streams of water rising in the interior of the plateau and flowing in agreement with the configuration of the surface normally towards the coasts, emptying themselves in four directions: westward into Hudson Bay and James Bay, northward into Hudson Strait, eastward into the North Atlantic and southward into the Straits of Belle Isle and the Gulf or the river of St. Lawrence. The Atlantic river systems of the peninsula belong to Newfoundland-Labrador.

After Labrador came under the British Crown, when Canada was conquered in 1763, both the *Dominion of Canada* and the *Dominion of Newfoundland* claimed the peninsula. Jurisdiction over the eastern part of the country was held sometimes by Newfoundland and sometimes by the Canadian province of Quebec and changed several times, but finally remained with Newfoundland (325, 602, 585, etc.). It seems scarcely necessary to argue that Newfoundland is the proper country to have jurisdiction over Labrador, GOSLING stated (325) at the beginning of this century: »by force of law, custom, and logic, Newfoundland claims Labrador from Blanc-Sablon to the northernmost Button Islands, and all the country drained by rivers falling into the sea on that part of the coast.» With these words Gosling finished his extensive work on Labrador. Conditions of administration and Civil Law remained, however, very uncertain in the eastern parts right up to March 1st, 1927, when the *Privy Council* definitely divided the peninsula and its resources between the competitors (764, 765, 766, 303, 334, 407, 408, 438, 455 b, 502, 602, 605, 863, 937, 1025, 1026, 1109, 1126). In doing so, the fundamental principle followed was, that those areas which drained into the Atlantic and the Straits of Belle Isle should fall under Newfoundland's government and jurisdiction, while the rest, five-sixths of the area, was placed under Canada's (see MCGRATH for further details). In the south, however, certain juridical circumstances made it necessary to deviate from the definite natural boundary: here it was to follow

the meridian through Blanc Sablon from the Straits of Belle Isle up to latitude 52°, along this parallel to the west to where it cuts the Romaine River and then along that river to its sources. Thence up to Cape Chidley in the north the water-parting again forms the boundary. At the end of 1933 the British and the Dominion Governments agreed that the Dominion of Newfoundland, transformed into a Crown Colony (585), should be surrendered to the Imperial Government.

Newfoundland's share is called Newfoundland-Labrador. It forms an irregular square with its northern point at Cape Chidley. Measured along latitude 53° its greatest breadth is about 800 km, and greatest length along the Atlantic coast about 1150 km; the area of the land is said to be 284,900 km². This estimate of the area is, however, a fiction. The boundary between the province of Quebec and the area of Labrador under the jurisdiction of Newfoundland should follow the watershed between Ungava Bay and the Atlantic Ocean until it reaches Cape Chidley. Yet the true geographical position of Cape Chidley is still unknown; some cartographers have suggested that this name should be given to an area rather than to a topographically fixed point (275). Moreover, the map is still merely a sketch which shows in a general way the connection between the systems of lakes and rivers, while, on the other hand, the exact position on the globe of, for instance, the watershed is not yet known with any satisfactory accuracy. In 1866 Chimmo (147) found a systematic error in the existing charts where the coast was lying ten or eleven miles too far to the eastward. Not until 1876 did Maxwell's chart give the first reliable chart of the southern part of the coast. Under these conditions it must be asked how great are the faults for the co-ordinates in the interior. It is therefore impossible to estimate the area correctly. The differences, however, which arise from these circumstances have little to do with the present book; the maps available are sufficient for it.

When reading the book the guide-maps, Figs 1 and 2, should be consulted. For more detailed maps the reader is referred to the special list of maps and charts, p. 891. It is specially recommended that the reader should make use of Titford's map on the scale of 1 : 267,200 of the year 1937. This map can be obtained through the Department of Natural Resources at St. John's.

Only Newfoundland's part of Labrador was studied on the spot by the author. As already stated, the information given is also restricted in all essentials to the part of Labrador under the British colony of Newfoundland. But it was in many cases necessary to become acquainted with circumstances affecting the peninsula as a whole. In this respect the description is based upon some very slight information in the literature; cf. bibliography, p. 827 sqqq.

Labrador was probably that part of the New World first discovered by the white men.

It may be surprising that the part of the American continent first seen by the white man — so far as is yet known — was the Atlantic Coast of the Labrador Peninsula. The man who saw it was the Norseman, Bjarne Herjulvson. On his journey to Greenland in 986 he was driven out of his course, and after drifting about on the ocean it seems that he touched land somewhere in the neighbourhood of Sandwich Bay (920 b). This discovery gave rise to several systematically organized expeditions starting from Greenland about 1000 A.D. with the object of discovering the resources of the new country and especially to investigate its suitability for being colonized by the Norse cattle-keeping people in Greenland.

The author has examined and systematized in a special study the material of the Icelandic sagas which is concerned with the so-called V i n l a n d v o y a g e s (920 b; cf. also 911 b and the great number of other works in the bibliography dealing with Vinland: 2, 8, 16 a, 24—26, 73, 89, 96, 112, 113, 114 b, 140 a, 179, 192, 198 a, 262, 264, 284, 304—306, 307 c, 329 a, 331, 432—433 a, 444 a, 447, 450, 451, 495, 506, 506 a, 507—508 a, 531, 532, 538, 541, 546, 598, 612, 670, 673, 675, 675 a, 681, 682, 689, 712, 775, 776, 784, 888, 900—902, 908 a, 912 a, 920, 920 b, 928, 930, 939, 945, 946, 1013, 1014, 1054 a, 1125). During these voyages the Norsemen touched H e l l u l a n d, which my study shows is the south-eastern part of Baffinland, Frobisher Bay including Resolution Island. Then travelling southward the northerners visited a land they called M a r k l a n d [old Nordic m a r k means wood] and which is undoubtedly the wooded part of Labrador's Atlantic coast. The object of the journeys was 'V i n l a n d'. Many people have wondered what part was meant by Vinland. According to the author's idea the word *vin* had originally nothing to do with wine or grapes; vinland was originally a *nomen appellativum* derived from the early Nordic word *vin* (pronounced vinn), plural *vinjar*, which signifies grassland or pasture suitable for cattle. It was probably not until the 13th century, when the Icelandic sagas were written down, that Vinland became a *nomen proprium*. According to the author's exposition Vinland was a part of the east coast of North America south of the Straits of Belle Isle beginning with the Long Range peninsula of Newfoundland (l. c.). Cf. Figs 6, 7.

An approximate picture of the geographical conditions in the countries visited is obtained from the sagas too, and it appears that no other part of the coast than that mentioned above corresponds with that picture. It is also most interesting that the Norsemen made the acquaintance of the abor-



Fig. 6. The coastal districts of the northern Atlantic from the map of the Islander SIGURD STEFANSSON in 1570. The original is lost, the reproduction is from a copy by THORD THORLAKSSON in 1670 in the Royal Library, Copenhagen.

igines — the *skrælings*. This I conceive to be a collective term including both Indians and Eskimoes; it was probably used with a tinge of contempt, just as the English in the Colonies use the word 'natives' (920 b). As late as in 1774 CURTIS speaks of Indian Esquimaux.

The coast of Labrador-Markland, as well as Vinland, was presumably visited repeatedly during the next centuries by people from Greenland; Markland was the nearest spot where fresh timber was available. Descriptions of these visits no doubt soon found their way to Europe (ADAM OF BREMEN) but were mostly forgotten; yet it is known that in 1347 at least, a Greenland vessel visited the Labrador coast (920 b).

During the last centuries of the Middle Ages the Norsemen's voyages to Vinland gradually faded from Europe's memory, though there is good reason to believe that the existence of land to the west of the North Atlantic was never quite forgotten. Nor was the Norse Greenlanders' contact with western Europe interrupted for very long if at all. In any case recent archeological exploration of their settlements in that country has proved that there was a rather lively trade between them and the centres of western European culture even at the end of the 15th century, although there are no historical records of it; *inter alia*, garments found in the graves of an old Norse churchyard at Herjulvsnes prove that the fashions of the elegant world in Burgundy at the end of the Middle Ages soon found their way even to these lonely northern settlements (688, 689).

The crews of the trading-ships meeting in European harbours probably told each other that there was a mysterious land in the far west which the Norse-



Fig. 7. Map illustrating the Norse Vinland voyages about the year 1000. The place names of the Sagas are printed in heavy types sloping to the right. Markland meant the wooded parts of Labrador's Atlantic coasts. Vinland stretched from Long Range Peninsula in northernmost Newfoundland southward. Compiled by the author.

men of Greenland used to visit. This information soon reached the great centres of navigation. It seems probable that just on the basis of it, for instance, the Danish-Portuguese expedition of about 1472—73 under the command of the Danish adventurers Pining and Pothorst was organized and went out in search of a land in the hidden west. This expedition, of which it seems that the Norwegian Jon Scolp (or Johannes Scolvous) was the pilot, was joined by the Portuguese João Vaz Cortereal. It went ashore on the east coast of Greenland (probably in the neighbourhood of Angmagssalik), and its further course had some bearing upon the rediscovery of the North American conti-

nent. Jon Scolp is believed to have touched land in Labrador. The fragments known of this pre-Columbian trans-Atlantic expedition have been thoroughly worked up and their reliability seems to the author proved beyond a doubt (548—551, 673, 447; cf. also 1046, 1047, 1064, 1065, 1066, 82, 192).

The reports of this attractive country in the west would naturally cause many other expeditions to start out for it, although no records of them have yet been found. Yet this is not surprising, for all such pioneer enterprises were anxiously kept by the state as trade-political secrets.

There is moreover some reason to believe that the Normans, the Bretons and the Basques had already begun to fish on the cod-banks off the New

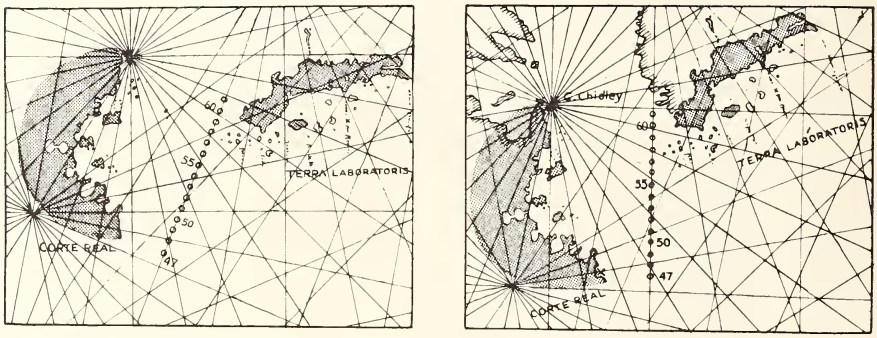


Fig. 8. The oblique meridian applied to the map, Add. M S. 31.316, British Museum (1047). On the left the original map. On the right Winter's reconstruction (cf. p. 53 and op. 1047).

World at the end of the Middle Ages (308, 510); there is at least strong evidence that they were there in 1504 and it is well established that in 1517 fifty Castillon, French, and Portuguese vessels were engaged there (58, 62, 308, 740). From this time onward the Newfoundland fishery was never interrupted.

About the early discovery of Labrador there is an extensive literature available (66 a, 82, 547, 548, 549, 551, 552, 553, 623, 899, 904, 1012, 1065, 1066, 1069; cf. 896, (?) 96 a, 740, 813). Regarding its history cf. 325, 381, 494, 767, 984, 997, 1010, 1024, 1040, 1076.

The Rediscovery and early Exploration of Labrador.

The reports of this country in the west spread thus among international adventurers, and in conjunction with the epoch-making discovery of Columbus in 1492 they can well be thought to have given rise to exploring and trading expeditions to the New World (1034, 1035). The English king Henry VII

knew all that MARTIN BEHAIM was intent on teaching; he realized that across the western ocean lay a continent and the mysterious isles Cipangu and Cathay; England was no longer the last human foothold on the world's rim. The King's first expedition weighed anchor from Bristol in 1497, and its 'navigator' was JOHN CABOT (64, 118, 123 a, 214, 414, 770, 921, 1007, 1034, 1035). The 24th of June 1497 CABOT sighted the coast of this enticing land. He called it *'prima vista'*. The 'new-found-land' was forbidding and inhospitable, there was nothing of the glittering domes and merchandise of Eastern Asia. The King was however satisfied with the results of this first voyage. Though the details are to-day very elusive and obscure, it seems quite certain that from this time onwards hardly a year passed without the dispatch of similar enterprises. The cod on the banks off the 'new-found-lands' soon became in itself remunerative enough to draw the English sailors across the stormy Northern Atlantic (123 a). In the year 1498 JOHN CABOT extended his explorations both north and south.

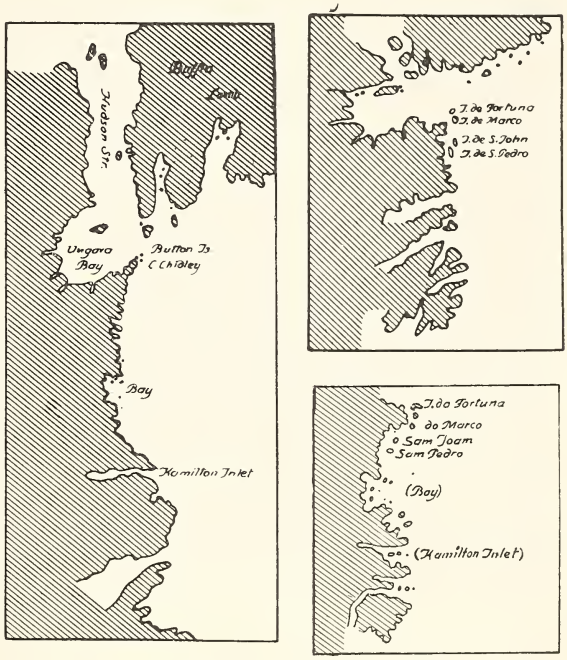


Fig. 9. DEE's map of 1580 (on upper right); JOÃO FREIRE's map of 1546 (lower to the right) and the modern outline replotted on a magnetic meridian (to the left) (926).

It is a widespread custom to consider his first landing to have been at Newfoundland, and CABOT has been celebrated as its discoverer. Yet one of the foremost authorities on his voyages, HARRISSE (413; cf. 409—412) writes about CABOT's discovery: the unbiassed critic does not know, has no means of knowing, and probably never will know exactly where CABOT landed in 1497 and 1498; nor do his journeys appear to have had any very great importance for navigation and exploration.

In 1499 SEBASTIAN CABOT conducted Henry VII's third transatlantic expedition.

The Spanish conquests in the New World at that time made Portugal restless (740). According to the papal partition of the globe in 1493 the 'newfound-lands' were allotted to the Portuguese sphere of interest of the unexplored parts of the world. Among other expeditions to the districts around the north-west of the North Atlantic several were sent by Portugal in order to find a route to Cipango and Cathay. It was probably not accidental that in 1500 Gaspar Cortereal (the son of João Vaz Cortereal mentioned above who accompanied the Danish-Portuguese expedition) went there. The ice conditions were difficult but he discovered some parts of the coast, probably of northern Labrador. In 1501 he landed in Newfoundland and explored its east coast; he was never heard of again (412, 325).

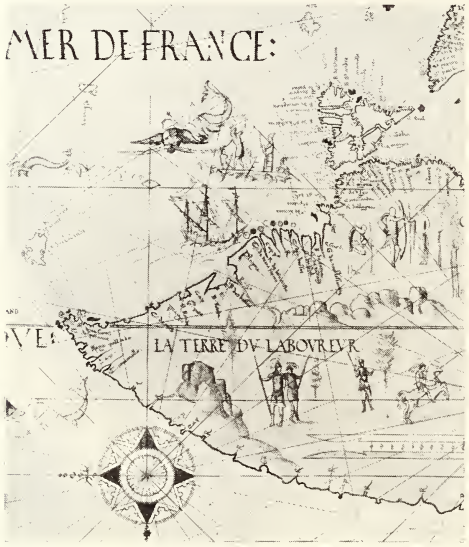


Fig. 10. Section of Descelière de Arques' map of the year 1546. Note the occupations of the Eskimoes and Indians. South is upward.

The discoveries of Cabot and Cortereal set in motion a veritable rush to the west; both exploration and fishing parties went out there from Europe. In 1501 an Anglo-Azorean party visited Labrador; in 1503 Miguel Cortereal probably ranged the coast of Newfoundland and Labrador in search of his relative Gaspar; and in 1504 an expedition was despatched from Portugal for the same purpose. In 1508 Sebastian Cabot and Sir Thomas Pert sailed along Labrador's eastern coast and probably still further north-west (64). It has been considered clear that in 1509 they penetrated the strait later known by the name of Hudson. Cabot assumed that this bay was what we call the Pacific and consequently that he had discovered the North-West passage (142 b). At the same time French, Portuguese and English fishermen began to ply their calling in the waters of the rediscovered coast (325).

The various voyages of discovery and especially the expeditions sent out with the object of finding new routes to India and China mostly touched the Labrador coast only indirectly. Meanwhile they supplied new important

information concerning the shape and position of that country and fundamentally extended geographical knowledge.

Among the more important voyages may be mentioned those of JACQUES CARTIER in 1534, 1535 and 1541 (48 a, 67, 68, 132, 133, 455 a, 573, 774) and the English expeditions: FROBISHER's three voyages 1576—78 (392, 601, 848, 889), JOHN DAVIS 1585, 1586, 1587 (209, 209 a, 210, 628), GEORGE WEYMOUTH in 1602, JAMES HALL and JOHN KNIGHT in 1606 (526). Sir THOMAS BUTTON in 1612, etc. (see Bibliography).

At the same time Portuguese and Dutch vessels were exploring. However, after Captain GIBBONS' voyage in 1614 those seeking the North-West Passage proceeded at once through Hudson Strait and had no contact with Labrador, for instance HUDSON (20). Only occasionally had the vessels touched the islands off the Newfoundland coast.

The Arctic was boycotted after BAFFIN (30) had declared in 1616 that the North-West passage could never serve as a highway to India (123 a).

The cartography of the 'New Found Lands' was developed and gradually improved by these voyages. It is just the geographical maps made then which are the strongest evidence that the coast discovered was that of Newfoundland and Labrador. Yet it must be remembered that the early navigators themselves were not at one in their conception of what land the name Labrador indicated.

The Origin of the name Labrador.

I have often been asked how the name Labrador originated. Many attempts have been made to solve this riddle. Such etymological guesses as *'le bras d'or'* and *'le bras d'eau'* do not deserve serious consideration. It has been reported that CORTEREAL gave the land that name because he thought it fit for cultivation: *Tierra de Labrador;* SEB. MÜNSTER in his cosmography calls it: *Terra Agricola.* This GOSLING finds absurd, considering the poor natural resources of the coast.

While the early explorers were travelling to and from Labrador great fortunes were being founded in western Europe on 'the ebony trade' [slave trade]. Also the principal cargo that CORTEREAL sent to Portugal in 1500 was 57 savages (possibly Beothuk Indians) and in 1501 the Anglo-Azorean expedition brought three Eskimoes [?] to England, and (according to 387 a) SEB. CABOT brought back with him three savages. It is believed that this traffic gave its name to Labrador: the natives who came to Europe were naturally considered excellent workers, slaves. It has also been suggested that the name

Labrador was taken from the Portuguese 'lavrador' or 'labrador' meaning labourer (64). Yet this opinion is not very convincing when it is remembered that the name Labrador originally designated Greenland (cf. p. 53).

Another more plausible explanation may be that the newly discovered coast got its name from the 'lavrador', landowner, JOÃO FERNANDEZ from the Azores who first saw the land (125). On the WOLFENBÜTTEL map of about 1530 the following is written in Spanish: This country was discovered by people of the town Bristol, and because he who first sighted land was a labourer from the islands of the Azores it was named after him. The origin of the name 'laboratoris' in the form of 'Labrador' subsequently used for the American



Fig. 11. The rolling rocky plateau of Labrador in the surroundings of Black Bay seen from the south-east, from the Straits of Belle Isle. Photo the author, 1937.

continent is probably to be sought in the fact that one of the companions of CORTEREALE bore the name of 'Lavorador', say TRAP (959) and BJÖNBO (83).

The evidence from these diverse sources seems to be conclusive until something more definite is disclosed in the future (cf. 467, 503, 1091, 1097, 325).

The early Cartography of Labrador.

The rediscovery and exploration of the Atlantic Labrador coast is closely recorded in the cartography as already pointed out. In the late-medieval cartography one cannot expect to find any maps of Labrador. The maps that are extant, on the other hand, give satisfactory evidence of the voyages made to the New World in the first decades of the 16th century, whereas the names of only few of the explorers or localities visited have been preserved.

Cartographic representations to indicate the position and extent of the country to-day called Labrador were made surprisingly early. To avoid misunderstanding it is wise to remember that Labrador and the many variations of this name did originally denote Greenland.

Very important maps were compiled based upon the observations of the early seafarers and they were of very great importance to cartography in general. We can however only consider here a few examples.

The first of these was a map of the world prepared in Lisboa 1502, the CANTINO map. Both as regards shape and position it is one of the most accurate of the hitherto known presentations; the distances from the old world of a 'ponta d'Asia' [Greenland] and the east coast of the island 'Tierra dal Rey de Portugal' [Labrador] are here quite correct. An Italian map of the world, the KING-HAMY map drawn 1502, is presumably based upon a combination of accounts from the journeys of CORTE-REAL and a journey undertaken by



Fig. 12. Chateau Bay, looking from the south-east. In the foreground, to the right, are seen the basalt covers, 'the Devil's dining table' (cf. p. 118), and behind them on the islands are the summer dwellings of some livyeres (cf. p. 727) or white inhabitants. Aerophoto ROYAL CANADIAN AIR FORCE.

British traders from Bristol. In this map is an island marked 'Terra Laboratis' which is identical with a 'ponta d'Asia' in the Cantino map.

Now, there is no doubt at all that to earlier scholarship Labrador originally denoted Greenland (1046, 1047, 926). But one finds this Labrador joined to North America in some maps about and after 1505, e.g. in REINEL's map. The fixed point in these maps is Cape Race, the coast from there first runs northward along from ten to fourteen degrees latitude and then with a great bay forming the angle turns east. This stretch of land with an eastward trend is the 'T e r r a l a b o r a t o r i s', while the stretch running north by south goes by the name of 'T e r r a C o r t e R e a l' or 'B a c a l l a o s'. Already the earliest of these maps show Cape Race correctly placed on latitude 47° N. Starting from this cape we find that the north-trending coast (Corte Real) extends far beyond the Straits of Belle Isle (52° N), and thus already comprises present-day Labrador. The maps show about the middle of this stretch of

coast an inlet, widening out into two lake-like formations and an adjacent island. This inlet is just the Straits of Belle Isle. The places whose names have survived south of this Strait (Conception Bay, Spear, Fogo, etc) lie quite correctly here south of this break. To the east of this south-north coastline the maps (CANTINO 1502, CANERIO 1502, Brit. Mus. 31316) show more land too as Greenland. Its position in relation to Iceland prove it and the degree of latitude is quite correct; here the name Labrador appears for the first time.



Fig. 13. The Labrador coast towards the south from Battle Harbour (536 b).

At the beginning of the 15th century the Corte Real Land included the present-day Labrador or Bacallaos.

The REINEL map of 1505 attempted to agree with the opinion of some sailors that Greenland was joined to the Bacallao. But it seems that the compiler had some doubt. Between the two he lets the Corte Real coast fall away to the west from his northernmost point [Cape Chidley] and brings the 'Labrador'-coast along from the east of the narrow between the two. There is no difference in principle between this and the 1502-maps.

The great interest of the PEDRO REINEL map is that it supplies the key to the whole Labrador mystery (1047). On this map there is an oblique meridian scale running east of Bacallao and on through Greenland. This signifies, says WINTER in his illuminating and penetrating study, that the northerly trend

of Corte Real Land is due to the westerly declination, and should therefore be corrected to north-north-west. A simpler explanation to us would be that REINEL had changed the position of the area concerned on the map itself. This however would have rendered the chart worthless to the seaman, to whom a sea-chart was a compass-chart, and its rhumb-lines compass-rhumbs. The ship's master laid his course by the ruled lines on the map.

What REINEL left undone WINTER did successfully and conclusively. He provided the map of c. 1502 in the British Museum collection no. 31.316 with an oblique meridian and then turned it so far round to the left that his meridian assumed a northerly position; Fig. 8, left. One realises at once that the south coast of the 'Terra Labratoris' agrees markedly with the south-east coast of Greenland and the coast designated as 'Corte Real' with that of present-day New-foundland and Labrador. By completing the map with the adjacent stretches of coast (west Greenland and Hudson Strait) the map becomes quite satisfactory in all such essentials as latitudinal position, coastal configuration and trend, and such discrepancies as the concave coast of Corte Real become unimportant; Fig. 8, right; cf. Fig. 9.



Fig. 14. Looking from south-south-west over Fishing Ship Harbour. Aerophoto the author, July 1939.

But as TAYLOR (926) remarks the isogonic system of the region is more than suggested by WINTER, the westerly declination increases rapidly between Cape Race and Cape Chidley; cf. Fig. 155. If he had considered the progressive distortion when he corrected the map the similarity to the actual conditions would have been still greater. The impossible in REINEL's creation has in this way been outdone by a hundred per cent.

Taking into consideration that the observations on the east coast were made partly under conditions which differed greatly as regards the width of the icebelt and visibility, the outline must be to some extent dictated by fancy.

Some other important maps conform best to this explanation. On the WALDSEEMÜLLER map of 1507, on which it is first suggested that the New World should be called 'A m e r i c a', the coast of Newfoundland, *Litus Incognitum,* is shown almost exactly as in the CANTINO and other maps. The Engroenlandt is seen joined to the north of Europe. The outline is amplified still more in WALDSEEMÜLLER's *Carta Marina* of 1516. Here Greenland, *Terra Laboratoris,* and the New World are recognized as separate countries. In the 1516 map the *Litus Incognitum* of 1507 is considerably developed; *Terra Nova* embraces the whole seaboard of Newfoundland and Labrador from 47° N to 59° N. The southern part is called Corterati [Cortereali]. Between them at 52° N is a large bay (Straits of Belle Isle?). The label attached gives important information. It reads in English translation (325): This land of Corterati was found by order of the King of Portugal by GASPAR CORTERATI, Captain of two ships, A. D. 1501. He was of the opinion that it was the mainland because of the great stretch of coast extending over 600 miles. It has a number of great rivers and is well populated. The houses of the inhabitants are made of long sticks covered with skins. Their garments are the skins of wild beasts, which they wear with the fur outside in summer but inside in winter. They paint their faces. They have no iron and use instead instruments of stone, there are large forests of pine trees and many fish, salmon, etc.' — This is exactly what one would expect from a sailor depicting the Red Indians, Beothucks (307 a, 455, 490, 583, 819) of Newfoundland.

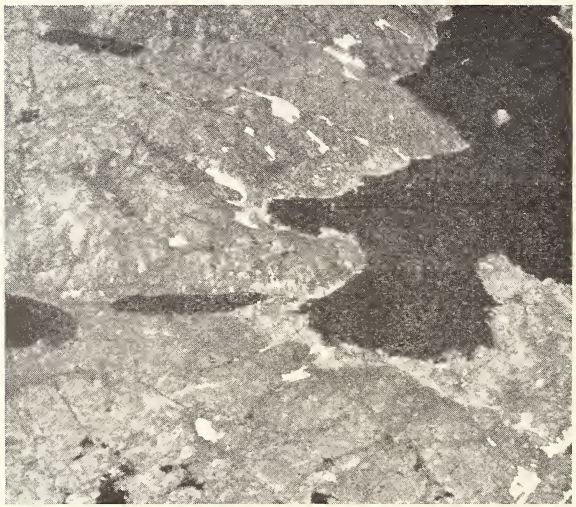


Fig. 15. Looking from south-south-west over Square Harbour. Aerophoto the author July 1939.

Since the WALDSEEMÜLLER map of 1516 Tierra Laboratoris or Labrador is never again used to designate Greenland. In 1531 one finds on the original heart-shaped map of the world by ORONCE FINE Greenland for the first time in

the history of cartography represented as a large island fairly accurate in shape and position and with the name 'Groenlant'. Fairly separated from this is a peninsula with the name 'Baccalar' [Labrador], but this is placed 10° too far to the north, and Newfoundland is lacking. Crudely drawn, but correctly placed in respect of Cape Chidley and Greenland, the Hudson Strait appears on the world-map of the popular Bâle Ptolemy of 1540.

The maps of Cartier and most of his successors in the 16th century have escaped our ken and were probably unknown even to his contemporaries. The stories of the discoveries as well as the cartographic works of the 16th century are mostly very obscure and garbled. This is of course the natural result of the secrecy observed in all affairs of state. The charts were and remained confidential and had little influence on later cartography. Meanwhile the information obtained by and from the sailors gave birth to new cartographical representation in which some progress can be noticed.



Fig. 16. The rocky ocean coast of Labrador near Tub Harbour looking south-east (468).

The whole of the north-east coast of America was for a long time termed the New-Found-Lands or the Newlands or Terre Neuve; even in 1534 Cartier wrote both of Newfoundland and Labrador as Terre Neuve. Nearly a century later on the map of Gatonbe who derived his information from the last journey of Hall 'Newfoundland' is clearly separated from 'Labrador' by a strait in 53°—54° N. In 55°—56° N is to be found a large inlet off which is noted 'Bank of Davis fishing' and in 57°—58° 'Hudson's Passage'.

On the Zerbst-globe of 1537, prepared by Gemma Frisius and Mercator, Labrador is shown as part of the Continent of America and Greenland also appears in its right place. Further the globe represents Newfoundland as an island situated in front of the mainland. The name Labrador is rightly placed beyond the dividing narrows (Straits of Belle Isle) on the American mainland (1047). The Newfoundland-Labrador coast had its definite outline as early as about 1550.

We will here take only a few more examples. The Descelières' map of

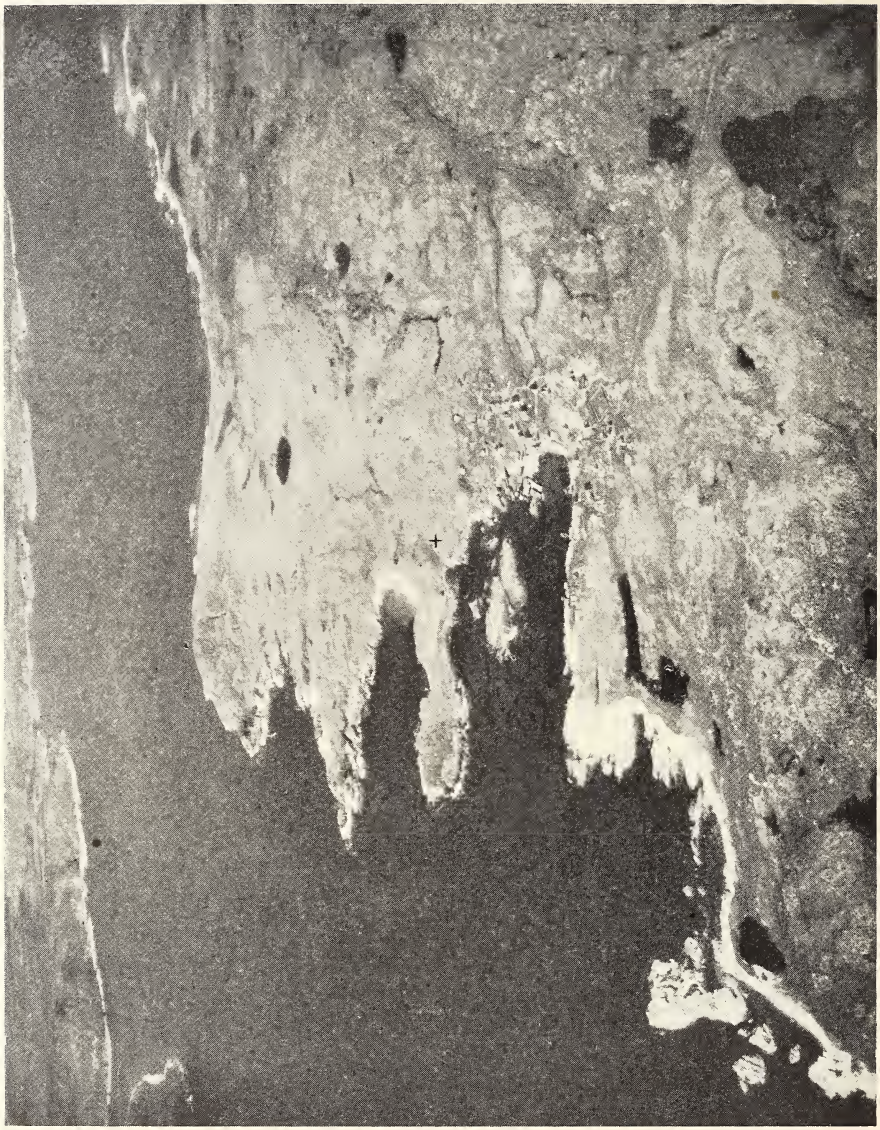


Fig. 17. Looking from east-north-east over Spotted Island. Aerophoto Forbes-Grenfell Expedition, 1931.

1546 is illuminating; Fig. 10. For the country south of the parallel of Belle Isle this map shows great progress. Newfoundland has many great bays, but the cartographer has exaggerated them to the point of dismembering the great island several times. The presentation of the Straits of Belle Isle with the island in the eastern opening is quite good; on the other hand the outline of the Labrador coast is in many respects surprising and the latitudes confusing, even if the declination is taken into consideration. By the great bay north of the Straits of Belle Isle is no doubt meant Groswater Bay or Esquimaux Bay (Hamilton Inlet). Northwards from that part the eastern and north-eastern trend of the coast line, particularly the great bend to the east between 57° and 58° N, is somewhat confusing, and it may be asked whether here again 'Terre du Labrador' really is meant for Greenland and not Labrador as on the maps of the REINEL-type. I think this was not the meaning of the compiler. The easterly trend of the coast line on the other hand may be explained by GOSLING's assumption that the variation of the compass greatly increased the confusion. Increasing from 30° on the coast of Newfoundland to 45° at Hudson Strait, the declination will cause a vessel sailing northward from Newfoundland to see the Labrador coast apparently opening continuously to the eastward. Already SEBASTIAN CABOT is recorded to have said that having reached latitude 57° N and finding the coast still turning to the east, he changed his course and sailed to the south.

If the declination is taken into consideration it will be seen on JOÃO FREIRE's chart of 1546 — Fig. 9 — that the whole Labrador coast including Hamilton Inlet was known in remarkable detail, but the Ungava Bay section is absent at this date.

In 1580 Dr DEE's map gives us a rather clear idea also of Ungava Bay and Akpatok Island; cf. Fig. 9.

Space forbids us to enter into the further development of cartography. The maps and charts from the 17th and following centuries studied by the author are listed under the heading 'Cartography' at the end of this book.

Newfoundland-Labrador of the present day is often shown in the cartography of the 17th century as E s t o t i l a n d. SAMUEL CLARK (152 a) understood Estotiland to be the district between Hudson Bay and N o u v e l l e F r a n c e, i.e. the areas around the Gulf of St Lawrence, and he mentions places in Estotiland such as Cape Charles and Cape Wolstenholm. The boundary to the south was said to be Golf du Chateau [Straits of Belle Isle]. The name Estotiland originated with ANTONIO ZENO 1380 (13) and its savage inhabitants have presumably been identified with the Eskimo by some carto-

grapher. We again find Estotiland in Ortelius' *Nova Orbis Descriptio,* 1570, and Vietttus' *Principes de Cosmographie,* 1637.

About 1680 the name N o v a B r i t a n n i a appears on the northern part of the Labrador peninsula, while the other greater part is called N o v a F r a n c i a (e.g. XCIV). The area of the latter became smaller in time (*e.g.* LXXXVII) and in the 18th century only N o u v e l l e B r e t a g n e (*e.g.* LXXXI) or Labrador is mentioned.

Yet again at the beginning of the 18th century the former name Estotiland is replaced on the maps by T e r r e d e L a b r a d o r o u d e s E s k i-



Fig. 18. Lake labyrinth on the northern part of the 'Lake Plateau' looking from north-east. In the foreground is Dyke Lake. Aerophoto the author, 1937.

m a u x, *e.g.* 1695 with Jaillot (LXVIII) and 1703 with De l'Isle (XXXIX), and on the Gulf coast is shown P e t i t s E s k i m a u x. The country of the Eskimo stretched from Détroit de Belle Isle right away to Achouanipi according to d'Anville, 1746 (VIII). Bellin 1755 (XIX) places Pays des Esquimaux even in the hinterland of the Gulf coast. With Lane (LXXII) and the later cartographists the modern toponomy develops.

No systematic surveyings were really made before the celebrated Captain James Cook was employed in Labrador in 1763—1767 in surveying the harbours and ports of the coast and in making fair and correct charts and drafts (283). It is said that his work was so accurate that relatively little altera-

tion of his outlines has been necessary. MICHAEL LANE followed up his work in 1767—76. The sailing directions of both these surveyors are given in the first edition of the 'North American Pilot'.

However the geography of the Labrador Atlantic coast long remained not very thoroughly known. For instance in 1786 the officer appointed to visit Labrador was ordered 'to explore the great inlet commonly known as Davis Inlet, in order to discover whether the same has or has not any passage to Hudson Bay or any other enclosed sea' (325).

In 1866 the Chamber of Commerce in St. John's petitioned the London Government to survey the Northern Labrador coast which was then entirely



Fig. 19. Looking south-east from the prospectors' camp at Sandgirt Lake. On the island the dense alder hedge can be seen which lines almost all the shores at the plateau. Photo the author, 1937.

uncharted. The next year Lieutenant CHIMMO (147, 148) was detailed for this work. He found the chart of 1772 in some respects unreliable; the whole coast had for instance been placed on the charts ten or twelve miles too far to the east. But it was not until 1876 that Commodore MAXWELL's charts, which gave the first reliable information about the coast, were published; they are still in use.

For the interior on the other hand no special survey has been made except for some river-valleys (see the annexed Cartography). Meanwhile the general map of LOW and EATON gives a fairly good orientation of the country, but is in reality a sketch map. The only topographic map of the scale 1 : 100,000 including the northernmost part of Newfoundland-Labrador is based on the aero-topographical work of the FORBES-GRENFELL expedition (cf. p. 891).

* * *

The aim of this long exposition of the fundamental stages of the cartography has been to familiarize the reader with the fact that with the exception of the coast line and parts of the skerry fence the existing maps are only at some places reliable. As the coast of Labrador along the Atlantic and the Gulf of St. Lawrence belong to those parts of the New World which were first visited by white men, it is surprising that interest for the great peninsula could gradually disappear to such an extent that in our days the country belongs to the least known part of the land area of the North American continent.

Part I. The land, its structure and surface forms.

Glimpses of Labrador. The peneplain.

The first time I saw the south-east corner of Labrador as it gradually emerged from the somewhat foggy, leaden-grey surface of the Straits of Belle Isle it towered aloft like a rather steep wall abruptly cut off by a slightly rolling horizontal plateau, approximately 200—250 m above sea-level; Fig. 11; cf. also Figs. 12, 13, 14 and 15. Seen behind a group of glistening icebergs, the barren, rocky coast made a forbidding, desolate impression.

When, two years later, I approached the same part of the coast in an aeroplane from the south, the aspect was different: the wall appeared not so steep and was found to be cut into by bays and valleys, above which rose a seemingly level plateau divided into a multitude of rather flat granite summits; Figs 12 and 14. Seen more closely, it revealed itself as moderately rolling country, its surface mostly hilly, interspread with many lakes, small swamps and extensive bare rocks, partly scattered with gravel patches (56, 588); Figs. 15—17. Between the different drainage areas were level belts, only rarely do patches of higher land occur, and only as an exception small mountain ranges with a sharp elevation. On the whole, however, these summits together form an undulating, rocky plateau. In its physiographical aspect, the country agrees fairly c l o s e l y with the coast of Finland at the Arctic Ocean and the Murman Coast.

Some time later I floated in the aeroplane above the endless wooded solitudes of the central part of the peninsula, over Lake Ashuanipi, Sandgirt Lake and others. Below me lay a great plain, strewn with a strange multitude of lakes and a veritable labyrinth of lakes and ponds, Fig. 18, alternating with very extensive swamps and bogs. The fact that the communications between the lakes were almost only short, broad currents, indicated the extraordinarily level character of the land surface; foaming rapids were seen in



Fig. 20. a. Looking from north of Shot Island in Strathcona Run toward the south over Paul Island. The falling tide forms a foaming rapid at the western end of the island (the right hand). b. Looking from Strathcona Run northward from Pillar Island toward the west-north-west. The precipitous island in the background in the middle of the left half of the picture is Pikàluyalik (=iceberg) Island. c. Looking westward over Maligiak from the small headland south-west from Itplik in Nunaengoak Bay, Nain district. Photos the author, Aug. 1939.

only a few places. Not until the plane began to land could one discover here and there some scattered, barren or semi-barren hills standing out against the horizon, Fig. 19. The land-forms have mostly such slight slopes that not

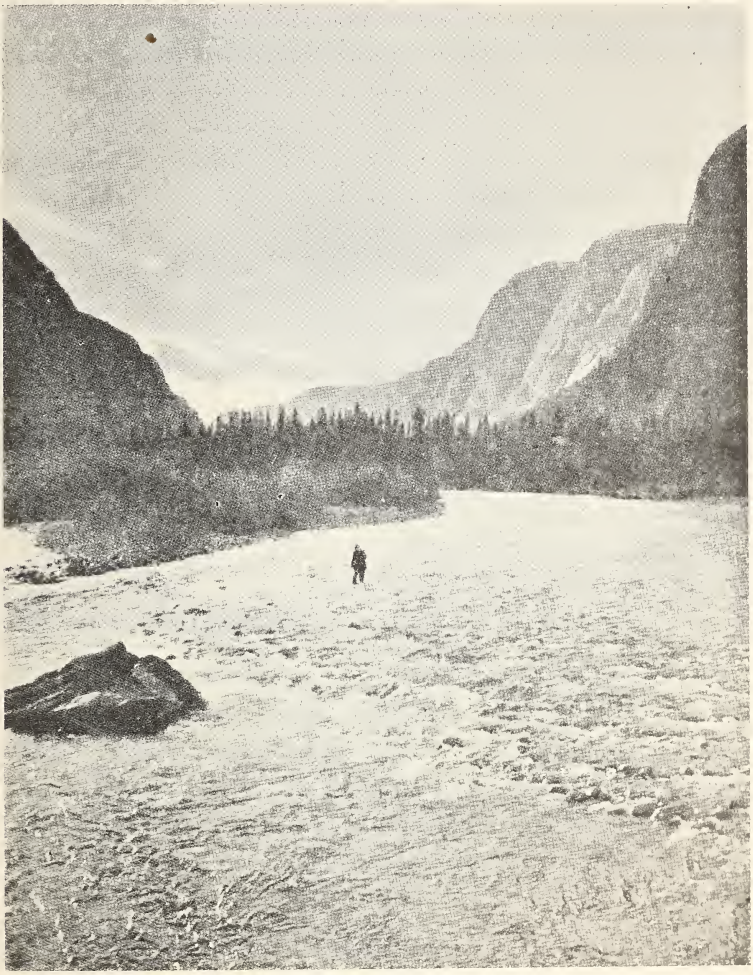


Fig. 21. The upper Fraser River (761).

even the shadows thrown by the setting sun revealed their existence from the air. When paddling in a canoe over the lakes, some few unconnected ranges of hills and some isolated heights, mostly irregular in form, can however be noticed all over the country. At Sandgirt Lake the plateau is about 550 m above sea level and the summits of the hills seldom more than

100—200 m higher. The level character of a plateau land was overwhelming; cf. Fig. 18.

We move towards the north-east, to the district of Nain. The landscape east of Nain, as far as the eye can reach, is an extensive archipelago from which 'the fingers of the sea', the straight, narrow fiords, Fig. 20, grip back towards the west into the land, followed by straight, narrow valleys, which after a relatively short distance end 'blind' in a great *cul-de-sac* in the border of a vast, upland plateau; cf WHEELER's map (in 1018) and Figs 21 and 22. The slopes of the islands and the sides of the valleys are very steep, and the higher ones are cut off abruptly by an undulating, rather level plateau,



Fig. 22. View across west end of Tessisoak on the Fraser River showing main river valley cut to sea level in the 1500-feet 'sekoujak' (= peneplain) plateau (1018).

Figs 22 and 23. On the whole these inter-riveraine plateaus are projections from the undulating plateau of the upland in the west, which reaches westward to the George River, Fig. 24. This 'roof of the Labrador', as PRICHARD called the upland plateau, lies westward from the Fraser River with an average height of about 1,700 ft. above sea level. Towards the south, west of Tesinyarsuakh Bay, WHEELER (1022) found its average elevation to be nearly 1,500 ft., towards the north, west of Tessialuk, it seems to be somewhat more than 1,750 ft. (1018). The plateau is not absolutely level; the drainage pattern is very complex owing to several minor divides. In the central divide region, some scattered summits seem to rise appreciably but gently above the average level, and low ridge behind low ridge rolls away interminably in every direction. The sides of the hills, the lake shores and the beds of the water-courses are strewn with numberless millions of erratic boulders. The flattened-out valleys and cups of the hills are dotted with lakelets, ponds and shallow marshes, here and there some grass is growing but no bush or tree of any kind breaks the dreary monotony of the prospect;

it is sheer desolation, abysmal and chaotic, great spaces as yet untrodden by man (761). The uniformity of the country gave an impression of limitless space, says WHEELER. The Eskimo call this relatively level country S e k o u j a k, meaning that it resembles the smooth, firm sea-ice along the coast.

It is obvious that this rolling plateau once stretched away to the eastern border of the Nain archipelago. But later its eastern part was cut up by the fiord-valley systems, and the valley formations of different orders disaggregated the plateau, and now the only remains of it are to be found on some of the loftiest islands and headlands.

We turn to the lonely and austere region of the north-east of the peninsula. Here the Torngak Mountains appear in all their grandeur forming a spec-



Fig. 23. Looking westward over the plateau between Fraser River and George River (761).

tacular landscape with some alpine forms: slender, knife-edged ridges and sharp, lofty peaks. The coast itself is one of the boldest and most rugged in the world, with grand promontories rising from 1,000—3,000 ft. directly out of the sea, often with nearly vertical cliffs, 1,000 or 2,000 ft. in height (157). A few rugged islands, occasionally reaching a height of 2,700 ft., are separated from one another and from the mainland by narrow, deep channels. Narrow, deep fiords run inland every few miles along the coast, some, like Nachvak, reaching 30 miles from the open sea. Nearer the Atlantic is a chaotic array of horns and sharply jagged ridges, Fig. 25. On the rim of the steep slopes with their fog-swept pinnacles and their ghostly outlines no regularity in height is to be found. Westward from the Atlantic front the mountains grow more massive in character with steep sides, more than a thousand feet in height. Looking over the centre of the mountain region, Fig. 26, and moving to the inner imposing range, Fig. 27, and especially the western part of it,

Fig. 28, one finds the massifs with the highest peaks and summits cut by quite horizontal, slightly rolling plateau facets. These remains are particularly smooth where they have been later somewhat levelled by the frost-riven jumble of blocks and débris. Seen at a distance from a suitable position, it is apparent that these facets are part of one erosion surface about 1,100—1,200 m above sea level; owing to extensive dissection in the coastal belt only small isolated portions of this surface remain. When one comes northward these steep-sided, flat-topped forms recur, as for instance the remarkable 'Castle Mountain' near Eclipse Harbour (364, 692). In the southern part of the mountain region this gently rolling surface is at a somewhat lower altitude, but



Fig. 24. Lakes on the watershed region on the plateau between the Atlantic Coast and George River (1021).

more connected, as e.g. in the surroundings of the inner parts of Saglek Bay, Fig. 29.

It is at once clear that from this surface, reminiscent of an old land surface, the geological agents, principally weathering, frost-splitting, and solifluction together with the action of running water and of the inland-ice have started to carve out the present surface forms: the dizzily deep valleys, the peaks and the ridges; cf. the most striking ridge in all Labrador, Mount Razorback, which towers precipitously high out from the sea, Fig. 30. Owing to the great difference in height between the plateau surface and the base level at the mountain plateau's eastern border the dissection here could advance more easily than for instance in the archipelago of Nain. Therefore in the eastern part of the Torngak Mts no single trace of a plateau has been preserved from obliteration. The forms in the eastern Torngak Mts are of such a character



Fig. 25. View west-south-west over two lakes in the Four Peaks region in the Torngak Mts. At about the middle of the upper right hand quarter of the picture is seen the highest summit of the Four Peaks (275).



Fig. 26. Looking south-west into Komaktorvik Fiord from over Seven Islands Bay. The rounded mountain near the centre is Mt. Roundabout. To the right is 'Shoal Cove' and farther to the right, across the neck of land, is Seaplane Cove (275).



Fig. 27. The inner range of the Torngak Mts is cut through approximately south-west and north-east by deep troughs with irregular, rocky, lake-dotted floors of which the one shown in this view is typical. Looking west (275).

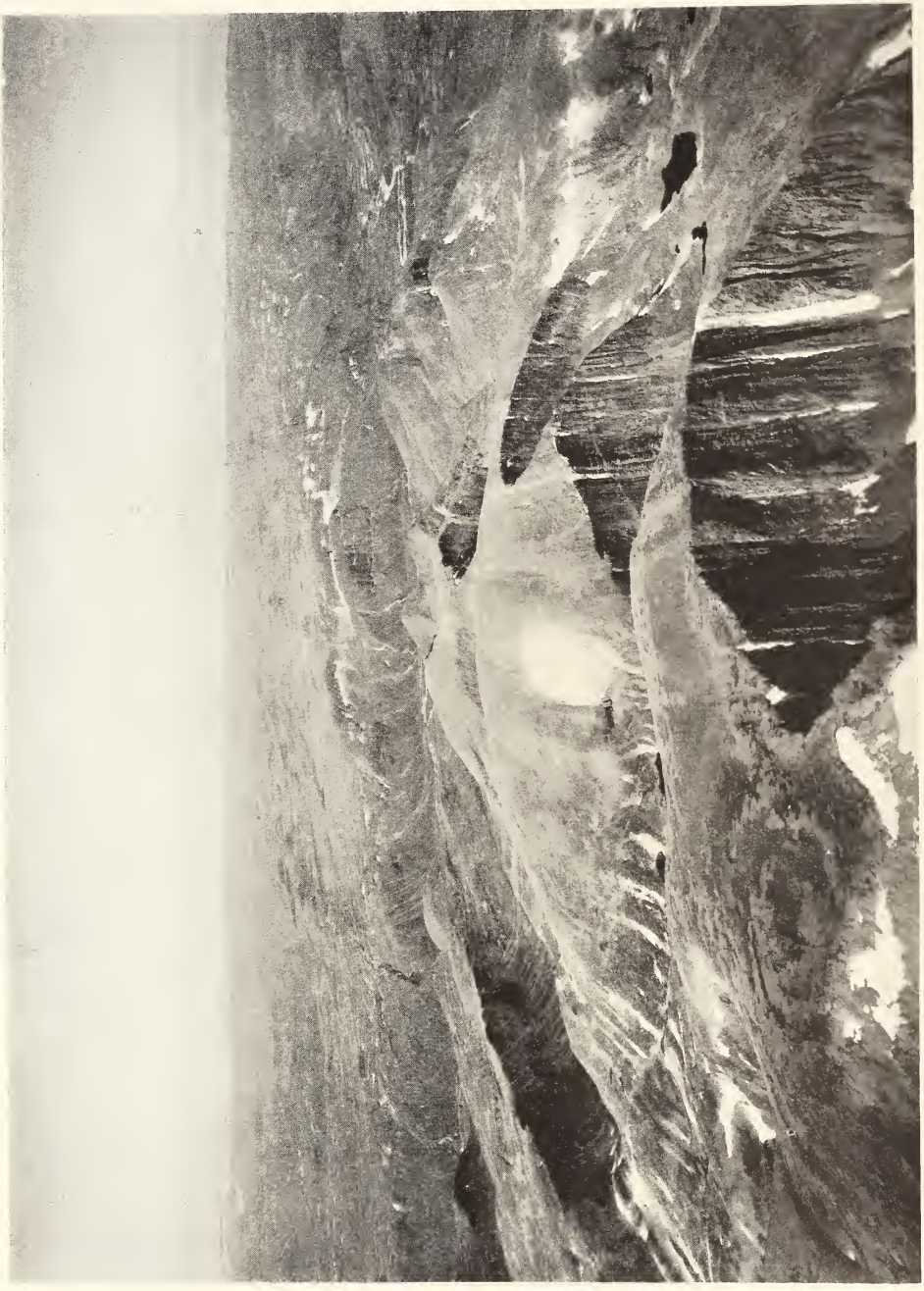


Fig. 28. Northern end of the interior range of the Torngak Mts. Looking north-west to the shore of Ungava Bay in the background. Cirque-cutting has notched the border of the palaeic peneplain that fills the foreground on the left (275).

that they may be called unfinished alps. Further west the valleys still cut deeply into the tableland but remains of the plateau surface are to be found in many of the peaks or mountain masses.

In the extreme north the peninsula ends in a forbidding rock plateau, which at Cape Chidley is cut off by quite perpendicular walls plunging abruptly into the ocean. In Fig. 31 the shape of the plateau is exposed in all its crudity



Fig. 29. Looking up the northern branch of the Saglek Bay fiord (275).

and ruggedness: a scraggy, ice-worn rock surface at 1,200 ft above sea level is clearly visible. The inland-ice, solifluction, erosion, and hurricanes have almost totally removed the loose, covering material; only in some clefts and depressions are small patches of soil to be found in which some extremely poor plants grow sparsely, having taken root between the snow patches. In this district it is thus the rock surface itself which alone determines the shape of the land. However, from the picture, Fig. 32, it is clear that the plateau is not always so level as one might suppose looking at it from a distance, e.g. from the sea; the surroundings of MacLelan Strait give approximately some idea of the considerable variations in height and the details of the topography.



Fig. 30. Razorback Harbour in the centre of the picture, Mt Razorback be



and the mouth of Nachvak Fiord, to the left. Aug. 2 1931 (275).

An account of some representative types of the varied surface forms of eastern Labrador have been given. These few instances should make it clear that among the land forms of Labrador the rocky plateau predominates. From the surface of the plateau, however, some scattered hills or mountains, monadnocks, or complexes of mountain torsos rise, most of them erosion remains which degradation has not yet had time to smooth out as elsewhere on the plateau. On the other hand into the surface of the plateau valleys of different orders have been cut more or less deeply, in some places even more than 1,000 m; the greater the difference in height has been between the plateau's border and the base-level, the deeper the valleys. The shorter the distance between the plateau's border and the base-level, the steeper the grade of the water-courses and the faster the plateau became dissected by the rivers' headward erosion. In such tracts the rivers and their tributaries grew by cutting backward and toward the sides, and concomitantly the valleys became gradually more and more enlarged, the inter-riverraine ridges narrower and more cut up, so that finally only small facets of the plateau surface remained on the highest erosion remnants, and at last even these will be worn away. On the other hand, in such tracts where the differences in height are small the plateau became only slightly dissected by erosion, and the connected plateau form still predominates.

In each of the districts mentioned above remains of apparently only one plateau surface have been found. One might therefore be inclined to assume that all the plateau surfaces appertain to one and the same great surface which once extended all over Labrador. This plateau represents what is called a p e n e p l a i n, a worn rocky surface which is neither a plain nor mountainous land.

The altitude above sea level of the parts of the peneplane mentioned show that the absolute height slowly increases from the south-easternmost corner of the peninsula (250 m) towards the west-north-west (550 m) and the north-north-west (580 m west from Nain and 1,200 m in the Torngak Mts). However, farthest north there is a drop from the Torngak Mts to about 400 m near Cape Chidley. From this it is obvious that other forces in addition to weathering and erosion must have participated in the moulding of the configuration of the land surface here. We shall return to this later (p. 145).

Yet, it seems appropriate to make already in this connection the anticipatory remark that we shall find the peneplain surface, supposed to be chronologically uniform, to consist of several metachronous, partly extremely ancient erosion surfaces, intersecting at infinitely sharp angles. Moreover, for many ages this series of surfaces has been subjected to repeated down-

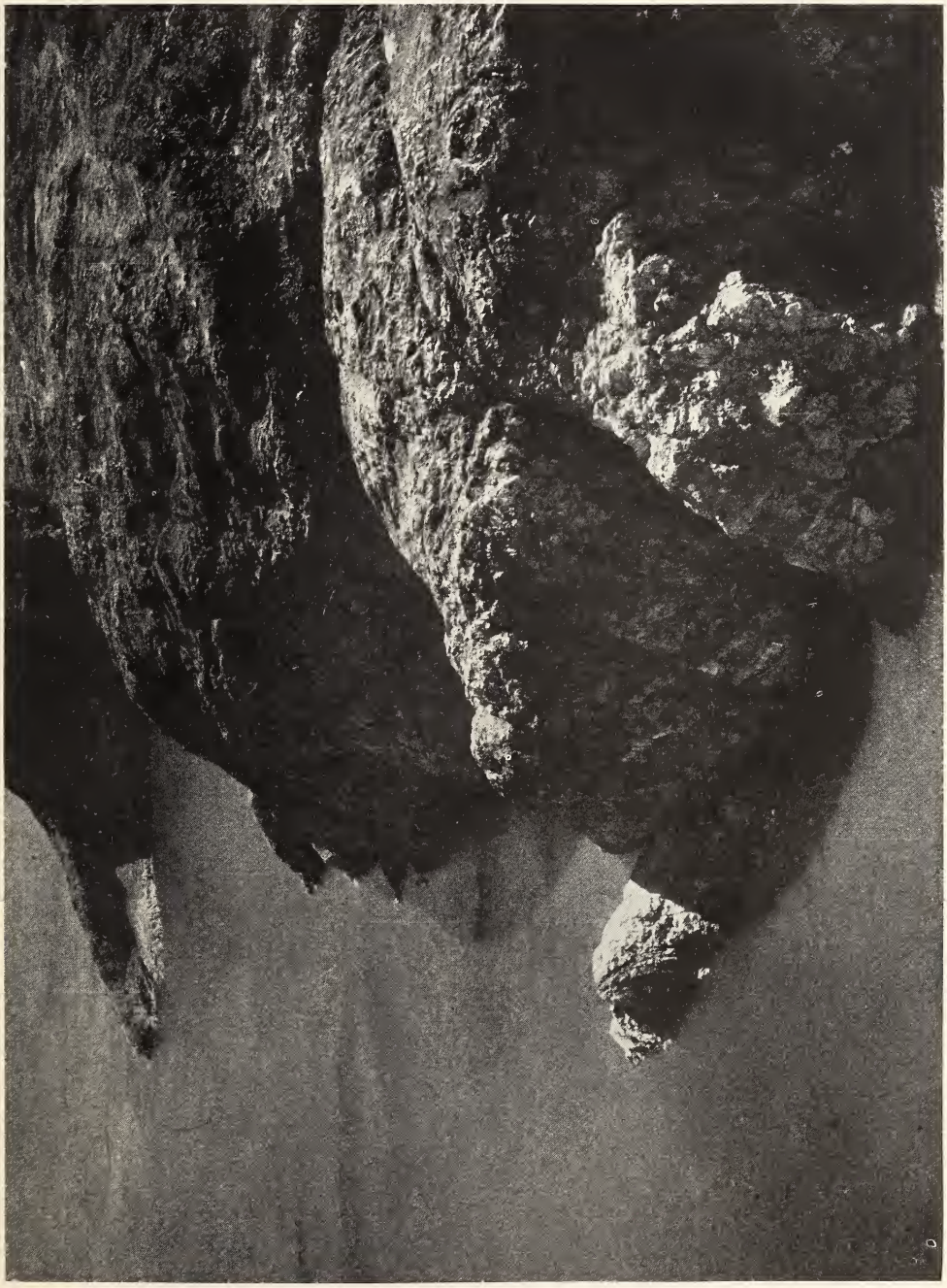


Fig. 31. Cape Chidley from the north. The cliffs are about 1200 feet high. August 7th, 1935 (275).



Fig. 32. Looking west through MacLelan Strait. The foreground is part of Killinek Island. In the distance to the left the low land at the Ungava Bay shore. August 7th, 1935 (275).

warpings and upheavals during which the rock ground has been partly fractured and partly crushed and broken up into extensive blocks, some of which have been displaced, tilted, faulted, or overthrust.

The development of the plateau and its surface forms is thus more complicated than is suggested above.

The physiography and the geological structure of Newfoundland-Labrador.

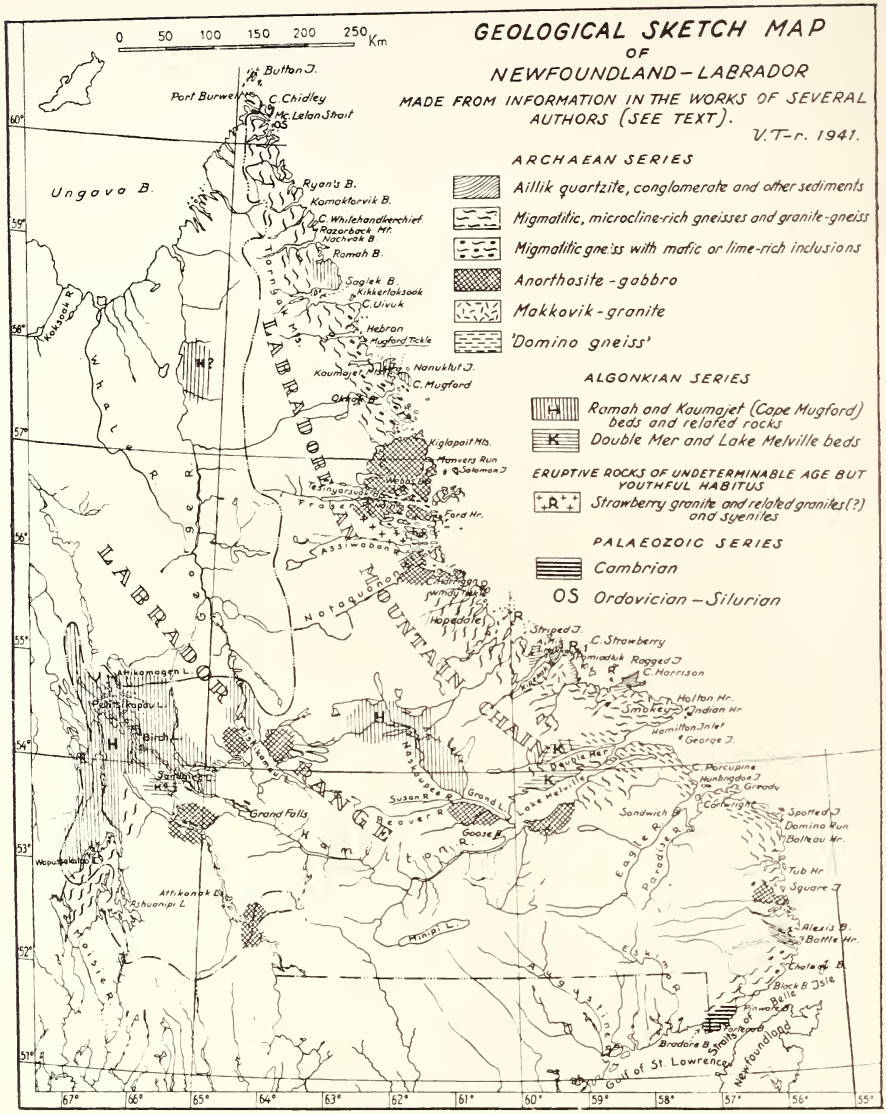
A somewhat intimate understanding of the processes by which the surface forms originated and the connections between them presupposes some outline knowledge of the geological structure of the country and its rise.

The leading features of the geological structure.

The available geological observation material is still not very comprehensive, nor is the connection between observations made in the different districts always very clear. This is especially true of the interior tracts of the country. Extensive research work has been done there during the last few years by the *Labrador Exploring and Mining Company*, but the results of their penetrating labour have not yet been published to my knowledge. It seems wise, therefore, to agree with COOKE, that further facts, as discovered, may partially alter the conclusions here drawn.

Laurentia, or the Canadian Shield.

Newfoundland-Labrador, forming the North American continent's northeasterly spur, also forms the eastern borderland of the great geographical-geological unit which is called L a u r e n t i a, or the C a n a d i a n S h i e l d. This extensive complex, in the centre of which lies Hudson Bay, is built up essentially of ancient, crystalline schists and eruptive rocks, woven into each other, but fossil-bearing sedimentary deposits are practically speaking wholly lacking. After pre-Cambrian time (late Huronian folding) the rocky complex, as will appear later, was not subjected to mountain-chain folding. In the course of long ages it has therefore been gradually consolidated and transformed into a solid b a s a l c o m p l e x. Hand in hand with that, erosion has proceeded more or less quietly and in process of time has


GEOLOGICAL SKETCH MAP
OF
NEWFOUNDLAND – LABRADOR
MADE FROM INFORMATION IN THE WORKS OF SEVERAL AUTHORS (SEE TEXT).
V.T–r. 1941.
0 50 100 150 200 250 Km
ARCHAEAN SERIES
Aillik quartzite, conglomerate and other sediments
Migmatitic, microcline-rich gneisses and granite-gneiss
Migmatitic gneiss with mafic or lime-rich inclusions
Anorthosite-gabbro
Makkovik-granite
'Domino gneiss'
ALGONKIAN SERIES
Ramah and Kaumajet (Cape Mugford) beds and related rocks
Double Mer and Lake Melville beds
ERUPTIVE ROCKS OF UNDETERMINABLE AGE BUT YOUTHFUL HABITUS
Strawberry granite and related granites(?) and syenites
PALAEOZOIC SERIES
Cambrian
OS Ordovician–Silurian
Ungava B.
Port Burwell
C. Chidley
McLelan Strait
Button Is.
Ryan's B.
Komaktorvik B.
C. Whitehandkerchief
Razorback Mt.
Nachvak B.
Ramah B.
Saglek B.
Kikkertaksoak
C. Uivuk
Hebron
Hopedale
Nain
Okak B.
Nonuktut Is.
C. Mugford
Kiglapait Mts.
Monvers Run
Solomon I.
Ford Mt.
Assiwodan R.
Notakwanon R.
Mokami R.
Striped I.
C. Strawberry
Ragged I.
C. Harrison
Holton Mt.
Smokey
Indian Mt.
Hamilton Inlet
George I.
C. Porcupine
Huntingdon I.
Gready
Cartwright
Spotted I.
Domino Run
Bolteau Mt.
Tub Mt.
Square I.
Alexis R.
Battle Mt.
Chalon B.
Black B.
Isle aux Morts
Port aux Basques
Gulf of St. Lawrence
Newfoundland
Sandwich B.
Eagle R.
Paradise R.
Goose B.
Grand Falls
Susan R.
Grand R.
Lake Melville
Kenamu R.
Kanairiktok R.
Hamilton R.
Wapustekamau L.
Atikonak L.
Ithuanipi L.
Minipi L.
Naskaupi R.
Kaipokok B.
Kaipokok R.
Whale R.
Kogaluk R.
Nutak
Kaumajet Mts.
Frazer R.
Kanairiktok R.
Paradise R.
Eagle R.
Naskaupi R.
Minipi L.
Atikonak L.
Wapustekamau L.
Kenamu R.
Susan R.
Grand R.
Goose B.
Sandwich B.
Lake Melville
Hamilton R.
Kaipokok R.
Kaipokok B

forced its way ever deeper into the rock ground, revealing yet more masses of the deep-seated rocks and flattening the land surface. Then, with time, the wide complex of rock plateaus has arisen, which above has been called the p e n e p l a i n of Labrador, and which gives its character to all the Canadian Shield.

The Archaean Series.

Within Labrador's Atlantic coast region, the ancient basal complex is mainly composed of gneiss and granite and to a less extent of schists and



Fig. 34. Banded gneiss at the mid-coast of Newfoundland-Labrador (536 b).

basic eruptive rocks. The former are for the most part closely intermixed in different proportions and form so-called m i g m a t i t e s. Here and there are also some scattered, clearly recognizable remains of metamorphosed sedimentary rocks: conglomerates and quartzites, also sandstones and limestones. Metamorphosed remains of volcanically deposited rocks, tuffs and greenstones, amphibolites, are also to be found with the migmatites in the basal complex. It is *eo ipso* clear that at a distant period of the earth's history, these clastic and pyroclastic rocks were widely spread over that part of the earth's crust now forming Labrador, but later they were successively either removed by erosion or transformed into crystalline schists. We shall soon get to know that during a mountain-chain folding the remains of the sedimentary deposits were sunk to great depths in the earth's crust and there, by the process

of regional granitizing, were transformed into other kinds of rock, chiefly into migmatite gneisses; Fig. 34. In a general way the granitizing here increases in degree from the coast in towards the land (536 c). However, as the metamorphosis has progressed with different intensity in different parts of the rock ground, the gneisses show somewhat different characters in different places on the Atlantic coast.

The prevailing direction of the strike is north-north-westerly, the dip varies very much but is steep all the way (56, 588, 200, 535, etc.).

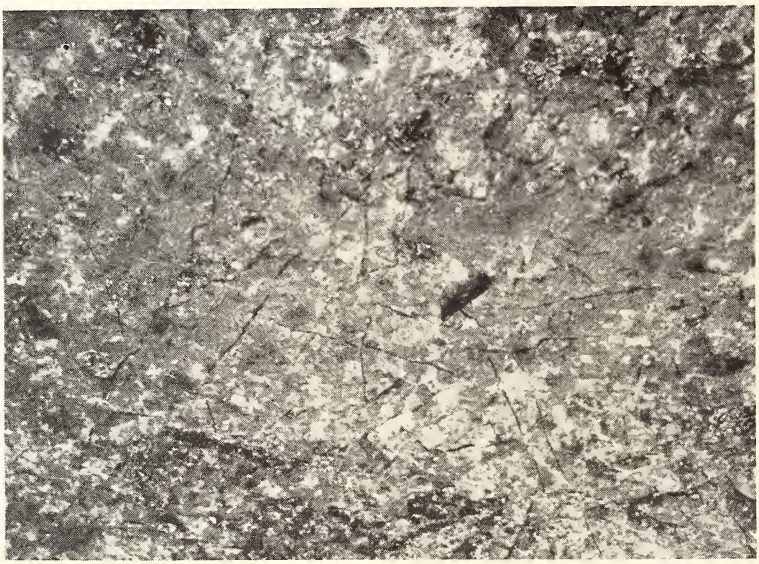


Fig. 35. Pegmatitic granite with fissures filled with hematite (536 b).

In some places, however, there are intrusive contacts. Primary structures also appear in the form of bedding, cross-bedding, and remains of conglomerate, so that it is possible to recognize sediments in the area of migmatite granites also.

In the coastal zone in the southern half of the Atlantic coast the basal complex shows in the main two different structural types (536 b). The one rock combination, which dominates, is a mixture of migmatite gneisses with predominantly grey gneiss granites, amphibolites and veined gneisses, interwoven with a younger generation of pegmatitic granites. The other type, which is found farthest south on the islands around Battle Harbour, consists of a sedimentary formation, very strongly penetrated by great pegmatite

stocks; Fig. 35. In the pegmatite masses are to be found in many places half dissolved fragments with astonishingly well-preserved primary layering of the sedimentary rocks consisting of grey quartzite sandstones and calcareous sandstones. This circumstance shows that the recrystallization has been incomplete only and has taken place at a fairly low temperature (535, 536).

In the northern part of the peninsula, in the Torngak Mts for instance, both the coastal and the inland ranges (cf. p. 159) are built up of a complex mainly composed of granite gneiss and gneisses rich in red garnet and black



Fig. 36. Aillik-quartzite with ripple marks. Aillik Point (536).

pyroxene. Pyroxene (hypersthene) granulites are also included. All the rocks are injected with aplite and pegmatite dikes and sills. Some lenses of amphibolite and hypersthenite also occur. In the northernmost part of the peninsula, again, intensively metamorphosed veined gneisses prevail, among which no primary structures have yet been found (694). Everywhere the strike of the rock is approximately north-north-west, mainly parallel to the coastline, the dip is generally steep; cf. Figs 33 and 322.

The primary character of the supercrustal rock remains found in the basal complex is to be seen only in some few spots and principally at the middle part of the coast (cf. 200, 535, 536). At Pomiadluk, west of Aillik,

DALY was the first to recognize a series of conglomerate and quartzite older than the surrounding granites. At Aillik Point we found the sedimentary structure, in spite of the great age of the rocks, thoroughly well preserved, with conglomerate beds and sandstone beds alternating with quartzite, and intruded along bedding planes by old sills of porphyrite.

The Aillik-formation can be called a quartzite series of Archaean character and has proved to be rather widely scattered along the coast. It appears from KRANCK's research that there must once have been a specially large, possibly



Fig. 37. Granitized quartzite at Cape Harrison (536 b).

one of the largest, connected quartzite complexes in Archaean formations (536 b). At Aillik Point the quartzites are only slightly affected by later deformation; they show both cross-bedding and ripple marks; Fig. 36. On the other hand at Pomiadluk DALY (200) found the silicious matrix of the conglomerate highly schistose. On the island of Turnavik the conglomerate is already more deformed. At Makkovik KRANCK found that the same formation is highly stressed, and the original textures are almost lost. The quartzite formation appears already at Cape Harrison, but has, however, taken up so much granitic material that its composition is very nearly an aplite-granite, rich in quartz (536 b), though certain sedimentary structural features have been preserved, Figs 37 and 38 a. Recognizable quartzites are found also on

Bear Island and in many places on the islands between Cape Harrison and Makkovik; the dip there is fairly flat, and well-preserved primary structures can be observed in many spots. The islands outside Cartwright and Hamilton Inlet, again, show greatly transformed quartzites and quartzite-gneisses.

Thus in Archaean time sandstones have played a prominent part along most of the earth's crust where now Labrador's coast is, and they have clearly been littoral deposits.

The contact between the microcline granite and the Aillik quartzite, for



a.

b.

c.

Fig. 38. a. Cape Harrison seen from the north; toward the left an iceberg. b. Striped Island, a little boss-like island in the Hopedale archipelago, owes its name to twelve nearly horizontal dikes of black diabase having penetrated along a system of master-joints. Looking from the south. c. The skerry-guard off Hopedale; looking east-north-east. Photo the author, 1939.

instance at Makkovik, is quite impossible to determine exactly, and in many other places also one can scarcely say whether one is dealing with a granite or a quartzite. Because of the granitization, the quartzites now show a gradual transformation into granites and when one first meets this metamorphic product one is perhaps inclined to call them gneiss granites, rich in quartz.

In some places, such as north of Kipekak Bay, the basal material has been subjected to such great deformation that the rock complex has been transformed into strongly parallel banded gneisses with a distinct flow structure indicating a highly plastic state during the deformation; Fig. 39. Evidently therefore the deformation represents here a deep-seated facies.

However, the sediments have been metamorphosed mostly past ocular recognition by other forces besides migmatization. Where sediments rich in lime and concretions once occurred, they have been metamorphosed into lime-



Fig. 39. Gneiss showing plastic deformation structure. Double Island of Hopedale (536 b).

silicates, principally garnet or hornblende; traces of such metamorphosed sediments, perhaps originally sandstones rich in lime, with layers of limestone and sandstone in between, were found by KRANCK on Huntingdon Island and at Battle Harbour. Gneisses containing remnants of supercrustal rocks of igneous origin and pure lime sediments, play a more important role in the middle parts of the coast; here inclusions of soapstone and 'skarn'-rocks are abundant. At the head of Tessinyak in Nachvak Fiord DALY found graphite gneiss and graphite schist. In the Torngak Mts the mineralogical composition of the gneissic rocks indicates a strong influence of heat and pressure (garnet, cyanite, sillimanite); in some places (Ryan Bay), the complex has undergone

ptygmatic folding, in others (Four Peaks) the rock has been transformed by stress and shearing into a mylonitic gneiss. According to ODELL (694) also the complex of the Torngak Mts was no doubt derived from a sedimentary, originally flat-lying series, composed of sandstones, slates, limestones, etc.

THE FOLDING ZONE.

All the coastal belt from Straits of Belle Isle to the Button Islands is thus built up of a continuous crystalline, folded complex. The strike-direc-



Fig. 40. Gneiss-granite cliffs at Fishing Ship Harbour (536).

tions of schists and sediments in the coastal border indicate a decided trend about north-north-west—south-south-east, which corresponds north of Domino Run rather closely with the average trend of the shore-line. Observations have certainly been made only at scattered places over the long coast and it may seem risky to generalize them yet. However, both the tectonic conditions and the metamorphic types of the rocks indicate fairly clearly that the sedimentary remains (conglomerate) in the coastal region belong to one and the same old sedimentary formation. Already in 1902 DALY pointed out that from the strike directions one can conclude that the average direction of the coastal-line is related to the tectonic trend of an ancient mountain-system of

which Labrador is a small remnant. The strata of this mountain system lay initially flat, but they became subjected to great crustal stress and folded and compressed along an axis orientated chiefly in a north-north-west and south-south-east direction. They gradually became caught up by folding, bent up, fractured, and faulted, and the sediment intensely compressed and tilted, so that the dip is now anything up to an angle of 90°. It was by this mountain-folding that the sediments were partly downwarped so deeply below the earth's crust that they were either remelted or changed by stress and metasomatic processes into new rocks. In this process a rearrangement of the mineralogical constituents took place, and the rock acquired a 'banded'



Fig. 41. Banded gneisses at Windy Tickle, being the roots of the Archaean Labradorean Mountain Chain. Photo the author, 1939.

character by concomitant constitutional change. As the rocks sank the process of granitization proceeded from below upwards and by it the rock mass was finally almost entirely transformed into a zone with banded migmatite gneisses. It is now easy to understand why the original structure of the rock was preserved only in some few spots. The whole rock mass was later cut by veins and stocks of aplitic pegmatite. It is to a great rhomboid mass of pegmatite plastered on the face of the headland that for instance Cape White-handkerchief, the prominent landmark of the coast, owes its name (692).

The different gneiss types we now find in Labrador thus correspond to horizontal sections of different depths in the earlier mountain chain, or as the geologist says, to the position of the migmatite front in relation to the present day erosion surface (536 b). The district of Aillik represents a quite high section of the migmatite zone.

The rocks of the basal complex visible today are thus remainders of that mountain chain. Of the magnitude and extent of the chain but little is known yet. Definitely one can only say that the whole of the Atlantic Labrador coast was involved in this revolution. How far inland it reached from the coast is not yet exactly known. But taking into consideration the observations made in other districts of the peninsula it seems probable that it included the whole of Labrador. Probably amongst others the highly metamorphosed series: marble, gneisses, schists and iron-bearing quartzites of Duley Lake (312) in the interior of Newfoundland-Labrador belong to the same folding complex. The mountain chain was probably raised to a very considerable altitude above its surroundings but it has left no visible morphological remains. In the course of a thousand million years, weathering and the onslaught of running water have gradually worn down the folding zone, and what we see today are only the once deepest parts, its truncated 'roots'; cf. Figs. 40, 41 and 42. The erosion was in action long after the crumpling and crushing of the mountain chain, and degraded it nearly to the undulating peneplain of the present day. The flat-topped summits in the Torngak Mts mentioned above are slightly eroded parts of this older peneplain and the sharp peaks and narrow valleys are cut out of it as has already been suggested, but this mountainous relief has nothing in common with the morphology of the ancient mountain chain. The axial direction of the folding trend is mainly north-west—south-east or north-south; however, the strikes vary very much in detail (cf. DALY's table in 200), and in the vicinity of the Straits of Belle Isle there is a north-east—south-west direction. Especially in that section along the Atlantic coast which is cut deepest into the earth's crust, the strike of the gneiss is very varied and



Fig. 42. The Kiglapait Mountains seen from the sea at the 57° parallel. Photo the author, Aug. 1939.

shows that the deep folding of the metamorphic rocks was undoubtedly influenced by the granitic intrusions. — Cf. COOKE's sketch (Fig. 1 in 174 a).

There is no indication in the structure in the middle part of the coastal area that the mountain-folding was in action after the penetration of the youngest pegmatites. At Domino Run, on the other hand, the gneisses show schistose structure and give, from a distance, the impression of a primary bedding. These rocks — by LIEBER called »D o m i n o-g n e i s s e s» — have

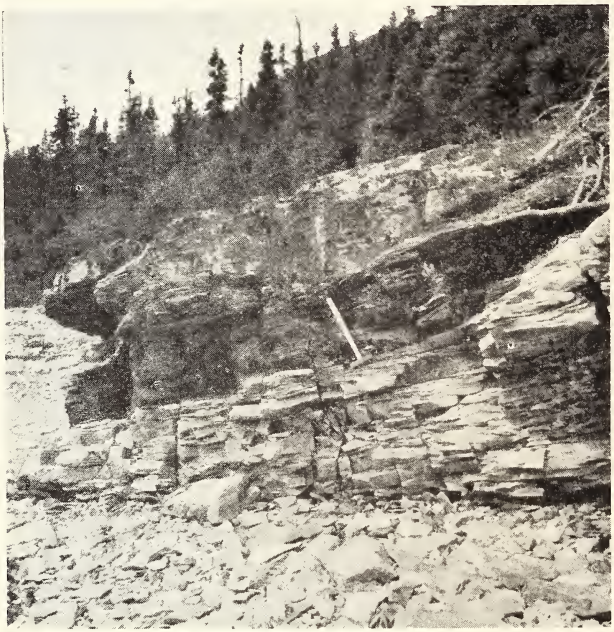


Fig. 43. 'Domino-gneiss' at The Narrows of Double Mer (536).

also been incorrectly apprehended by former explorers as sedimentary rocks (575, 716). A close examination has however shown that they are highly sheared rocks grading into mylonites, which derive from primary rocks of varying composition, and have evidently been formed along shear-zones in the rock-ground indicating big thrusts of comparatively recent age; Figs. 43 and 44 (536). Several zones are to be found running parallel with the coast up towards Hamilton Inlet, the dip of the fracture cleavage being always small. In some places there are real mylonite gneisses here.

Intrusives in the basal series.

This Laurentian basal series has been protruded by different igneous formations.

Anorthosite, including the labradorite.

The famous anorthosites (labradorites) of Labrador occur throughout extensive areas of the peninsula at the south coast, also on Square Island, at Nain-Kiglapait, Salomon Islands and at Grand Lake, around Lake Mishikamau,



Fig. 44. 'Domino-gneiss' with folded fragment of a diabase dike. Devil's Look-out (536 b).

Gabbro Lake, Attikonak Lake, etc.; cf. Fig. 33 and Low's map (588). Dull light-grey in hue with the surfaces smoothed out by the polishing action of the inland-ice, their slopes almost entirely devoid of vegetation, these masses form great desolate hummocks all over the gabbro area (200); Figs 45 and 46. Huge dikes of granite pegmatite and aplitic veins interlaced cut through the anorthosite, in some places. Such dikes are, for instance, to be found in the anorthosite cliffs on the southern shore of Strathcona Run and north of Slambang on the Aulatsivik Island, both in the archipelago of Nain. On the other hand, in a vertical cliff at Clarck Tickle is to be seen an enormous angular block of the gneiss as an inclusion in the anorthosite.

In the surroundings of Itplik the anorthosite is found as inclusions in the younger eruptive rocks; Fig. 47.

The universally known blue, green, bronze schillerizing labradorite is found in the Nain district in limited bands in the anorthosite, also the pale green amazonite. The ordinary biotite gneiss underlies the eastern end of Paul's Island, but a few miles west of Ford Harbour it comes in contact with the famous anorthosite and allied gabbro whence is derived the labradorite. A quarry was opened at the end of last century on the island Napoktulagatsuk, afterwards called Taber-island (153a, 200, 364), where the labradorite was found 'precious'. The rock is here pegmatitic in appearance,



Fig. 45. Looking over the anorthosite mountains north-west from Chaplin Bay in Manvers Run. Raised beaches at 73.6 m to the right, Man-of-War Brook to the left. Photo the author, 20th July 1937.

forming pocket-like masses, and in sunlight it looks rich and beautiful: the dominant colour is the familiar blue, but it is associated with vivid green, bronze, orange and red. The schillerizing variety is however found sporadically all through the Nain area. Perhaps the most precious labradorite the writer has seen is to be found on the Salomon Islands in the outer Nain archipelago. The labradorite is called 'fire-rock' by the Indians (434, 114; 279).

Basic intrusive rocks.

Basic intrusive rocks related to the anorthosites are known especially in the south-eastern part of the territory. They are older than the younger granitization and must therefore be near in age to the anorthosites. In the districts around Domino Run, for instance, and between it and the districts

around Hamilton Inlet there are a very large number of mighty dikes of gabbro-diabase. The outcrops, owing to the rock's considerable resistance to weathering, appear as high, steep walls forming the summits and highest ridges of the mountains, Fig. 48, and projecting as black, sharp-edged headlands out in the white fringe of breakers, Fig. 49; in some places they have inspired the imagination of the people: Devil's Look-out, Tumbledown Dick, Indian Head, Fig. 50, etc. On the north side of Hamilton Inlet, DALY stated, the surface is occupied by a multitude of great dikes, thick sheets, pods or stock-like bodies of these rocks which, on account of their black colour, contrast very strongly with the other crystallines round about; Fig. 48. He wrote that nowhere are the basic dikes so massive or so influential in determining the topographic forms of the country than in this region. A good example is given in the surroundings of Indian Harbour; cf. Figs. 48 and 49. The basic rocks form there all the higher elevations which thus assume the varying outlines of ridges or domes, and between them gneisses and granites, on account of their inferior power to resist erosion, now underlie valleys that open seaward as bays in the coast-line, the dikes forming headlands. One must go far to discover so fine an example among crystalline of control over land-forms — the control of differential resistance to weathering, DALY points out.



Fig. 46. Precipitous anorthosite rocks without vegetation, some two hundred m high on the southern shore of Nunaengoak Bay south-west from Itplik, Nain district. Photo the author, Aug. 1939.

These dikes were later broken up and greatly metamorphosed by tangential movements in the earth's crust. Following KRANCK it is scarcely an accident that the extension of Domino-gneiss coincides with the gabbro-diabases and their metamorphosed derivates.

In many places also in the central part of the coast the granitized quartzite formation is penetrated by dark porphyrites and metabasite dikes which correspond to the formation mentioned above. There too they have been broken up by later tangential movements (536 c).

This dike-like formation with its different derivates: coarse-grained gabbro peridotite, Fig. 51, and norite, is found at some places penetrated by pegmatitic dikes, and is thus older than the latest granitization of the folding zone. From this we must also conclude that the basic intrusives and the anorthosites are roughly contemporaneous formations. KRANCK associates these rocks with the anorthosite-gabbro rocks and supposes that they form their hypabyssic parts (535, 536a).

Between all these intrusives one finds the contorted and generally highly inclined crystalline schists, chiefly banded gray biotite gneiss and dark col-



Fig. 47. Debris of anorthosite (white) occurring as inclosures in Strawberry granite on the small headland south-west from Itplik in Nunaengoak Bay, Nain district. Photo the author, Aug. 1939.

oured, coarse hornblende gneiss with lenses of segregated hornblende and biotite. Banded gneisses, cf. Fig. 41, extend seemingly uninterruptedly from Hopedale over Cape Harrigan and the outer skerry fence over Sandy Island, High Island, Sculpin Island and Lindenburg Island to Cape Mugford and further northward. This trend, for instance, separates from each other the anorthosite areas of Nain and of Salomon Islands.

In the southern parts of the coastal range of the Torngak Mts dikes of charnokite and an anorthosite dike have formed some upstanding peaks and pinnacles and jagged crests on the summit ridges owing to their greater resistance to weathering. Especially interesting is the great upstanding mass of charnokite of the Razorbak Mountain, one of the most



Fig. 48. Looking south-east over Indian Harbour, with fleet of fishing schooners at anchor. The dark, outcropping basic sheets form the highest ridges. The Grenfell Hospital appears to the right of the centre as a white square above the small island in the harbour, 1931 (275).

rugged and most alpine mountains on the coast, with its slope at an angle of about eighty degrees, Fig. 30; the rock is composed of black, lustrous hypersthene and bluish, almost opalescent quartz and buttresses up the highest eminence of this ridge above the neighbouring hills, rising abruptly to more than 1,200 m above the sea. The K i g l a p a i t Mts, Fig. 42, the southernmost of the big mountain groups on the coast, is composed of intrusive anorthosite with gabbro and norite, studied for many years by WHEELER. These rocks being very resistant to weathering, the intrusive now rises as a finely serrated ridge. All these rocks are cut by diabasic dikes.



Fig. 49. Outcropping peridotitic dike forming a steep ridge continued by islets on the eastern side of Indian Harbour Island. Looking north-east. Photo the author, July 1939.

Minerals

Apart from a pyritous deposit in the Ramah series (p. 97) at Rowsell Harbour no sulphide mineralization was seen anywhere in the Torngak Mts. This is due, ODELL thinks, to the fact that apart from pegmatites and local acid differentiates, granite intrusions that might have accompanied the mountain folding are absent from this region.

In the folding zone, called by KRANCK the

The Labradorean Mountain Chain

we have to deal with two different geological cycles (535).

The f i r s t and o l d e s t c y c l e is registered by the pebbles in the conglomerate at Aillik, etc. mentioned above. These consist of highly metamorphosed, granitized rocks, schists and gneisses, which at present reveal nothing of their original character. Nor is it possible to ascertain the relative importance of the unconformity indicated by the conglomerate. The wide distribution of the former sediments along the coast indicates the possibility that there was a really considerable period of subaeric degradation before the conglomerate was formed.

The sedimentary formations of Battle Harbour, Huntingdon Island and Aillik-Makkovik, etc., as well as the metamorphosed sediments of the Torngak

Mts are associated with the second cycle. KRANCK considers that these sediments may be the remnants of a geosynclinal series which have yielded the most important contributions to the gneissic rocks of the coast.

In the folding process at the end of the second cycle sediments and schists of both cycles were thus included.

With this Laurentian folding the Archaean era in Labrador closes.

Correlations with Canada and Fennoscandia.

It is not yet possible to correlate with any degree of certainty these two cycles with the formations of those parts of Canada which have been subjected to thorough geological research. The known conditions indicate that this Labradorean mountain chain is very old (535). The metamorphic series of Tetragona Mt in the Torngak Mts was recorded by COLEMAN (157) as being of Grenville type. WILSON (1038) believes that the infolded old sediments are pre-Huronian, and the limerich gneisses in southeast Labrador are referred by him to the Grenville series. KRANCK (535) compares them to the Timiskaming series.



Fig. 50. 'The Indian Head', a weathered peridotite outcrop toward the south of the hospital, from which Indian Harbour has its name. Photo the author, July 1937.

The petrological and tectonical likeness between this Laurentian folding complex and the folding complex of the Sveco-Fennides of Fennoscandia is striking. The external agreement with the presumably corresponding complexes in Fennoscandia is conspicuous, because the American basement complex also consistently forms a peneplain with a small number of more remarkable erosion remains. Already in 1900 DALY stated that the sediment formation has a close superficial resemblance to the Archæan metamorphic conglomerate series of Finland which he had seen in the field. KRANCK has later referred to the similarities between the rock combinations in the Labradorean mountain chain and the Sveco-Fennides migmatite gneiss mixture in Fennoscandia (536 b.)

It is, of course, not possible to confirm these correlations definitely in the present state of our knowledge, but I think DALY and KRANCK are right. The general result of the investigations hitherto made is that this Archaean complex is the basis of all the other series yet known in Labrador.

The exhaustive analysis of this ancient mountain chain will form one of the most interesting results of the research carried out by the explorers from Finland. KRANCK has already pointed out (536 b) that the strip of Labra-



Fig. 51. Coarse-grained peridotite. Smoky Island (536).

dor's coast has shown how the world's Archaean rock complexes can supplement each other when the solution of both petrogenetic and purely geological questions is involved, and this natural museum of rock types therefore invites continued examination. Moreover the Labrador coast makes an important contribution to the explanation of the rise of these peculiar hybrids, the migmatite rocks. Further, KRANCK assumes that the white granites in this part of the coast are derived from the partial melting of the basal material, so that it must consist of granitized sandstone material. But the reader is here referred to KRANCK's writings (cf. bibliography).

The Algonkian Series.

During long eras the Labradorean mountain chain was disaggregated and worn down right to the very roots, so that a new land surface originated there and assumed the shape of a levelled peneplain, perhaps resembling that of the present day in the interior of the peninsula. On this peneplain new sediments were deposited with great unconformity; Fig. 52. The Cape Mugford and Ramah series are evidences of these sediments (200, 692, 694, 535, 536).

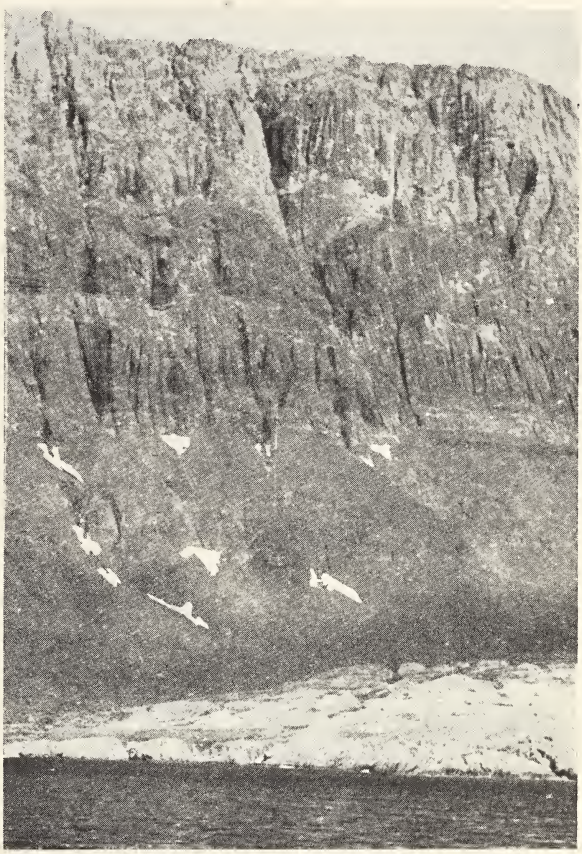


Fig. 52. The cliffs on the western side of the northern entrance of Mugford Tickle showing the unconformity between the vertically upfolded, light-coloured archaean gneiss with north-north-westerly strike (below) and the quite horizontal strata of the volcanic and pyroclastic Kaumajet series with schists, tuffs, ashes, pillow lava and diabase. The wall is some five hundred meters high. Photo the author, 1937.

The Ramah beds.

At the north-easternmost part of the coast a series of sedimentary rocks: black slates, quartzites and impure dolomites, was laid down on the pre-Algonkian peneplain in a shallow sea. These beds thus rest uncomformably upon the upturned, rather smooth worn outcropping strata of the gneiss complex; the rock surface of the Ramah series shows relatively more moulded surfaces than the basal complex. These so-called Ramah beds were observed already in 1811 by Kohlmeister and Kmoch. Some miles north of Saglek Bay Delabarre met with bands of black slate alternating with quartzite and then



Fig. 53. North shore of Saglek Bay. Mt Blow-me-down lies one inch above and one quarter of an inch to the right of the centre. The syncline of the folded Ramah beds upon the upbended gneisses is visible, 1932 (275).

sandstones and quartz breccias, and these persisted to a point some four miles north of Ramah Bay. The sediments were highly indurated and often somewhat metamorphosed. The corresponding massifs are tabular with very low dips and are plainly stratified, he states. The Ramah series south of Nachvak Fiord lie mostly at moderate angles unconformably upon a basement of quite vertically dipping gneiss. Basic dikes cut the base but not the Ramah series, ODELL pointed out. DALY's, COLEMAN's, ODELL's and others' studies have confirmed that remains of this sedimentary series are today only to be found southwards from Nachvak Fiord to Saglek Fiord,

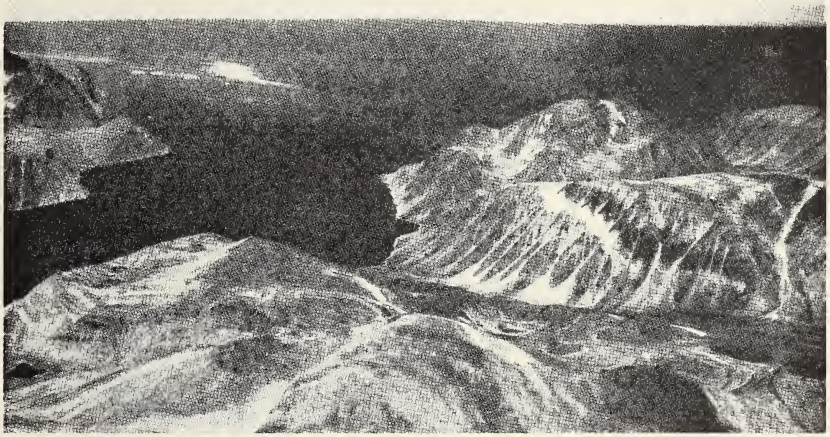


Fig. 54. Nachvak Fiord from the south-west. Toward the right the Ramah beds are seen (Cf. Fig. opposite p. 27 in 692). Photo FORBES-GRENFELL EXPEDITION, 1931.

forming a rather flat-lying, syncline covering, extending over some 200 square miles with a thickness of some 2000—2200 m (692, 694); Figs. 53 and 54. In the main the rocks of this complex have been surprisingly little metamorphosed, but in one place, Rowsell Harbour, rather close folding of the shales and other beds has been observed (694). An old pyrite working at the head of Nachvak Bay witnesses to the mineralization of the rock.

It is rather surprising that all the basic dikes are abruptly cut off at the base of the Ramah series. The great uncomformity and the fact that no veins or dikes of granite or basic rocks penetrate the series indicates how much older the gneiss complex must be. The older mountain-building movements must thus have come to an end long before the deposition of the Ramah series (cf. p. 117 sq.).

The composition of the Ramah series and the fact that the basic dikes which are so conspicuous an element all over the coast are abruptly cut off at the base of the series, makes it likely that here is a series that should correspond to the Eo-Cambrian of Fennoscandia (e. g. on the Fisher's Peninsula in northernmost Finland, or the somewhat later Eo-Cambrian series of the humid facies).



Fig. 55. Cape Mugford. This headland which forms a nearly vertical sea-cliff is about 2000 feet in height. The basement of the sedimentary complex is represented by an irregular floor of contorted and faulted gneisses and amphibolites (light-coloured in the picture). This surface rises to about six hundred feet. Next above it comes a series of black slates fifty to one hundred feet thick, indurated at the contact by a comformable three hundred-feet sheet of diabase. The edge of this sheet forms one of the lowest, hard cliffs above the basement. The diabase is overlaid by a great thickness of slates, quartzites, sandstones, quartz-breccias, volcanic agglomerates, trap layers and pillow-lava. The greater part of the thousand-feet cliff is made up of a volcanic breccia (200). Photo Forbes-Grenfell Expedition, 1931.

The Kaumajet (Cape Mugford) beds

form another group, isolated and restricted both topographically and geographically, which has been preserved from obliteration by down-warping.

Fig. 56. Cliffs in the Kaumajet Mts. In the light-coloured, gneissic basement (below) one can distinguish the schistose structure with steep dip, whereas in the sedimentary formation (above) the slight dipping of the strata is visible. The airplane in flight, which appears against the dark stratum in the shadow to the left of the centre is estimated to be half-a-mile from the cliff, and gives some impression of the grandeur of the scenery (275).



Fig. 56

The mountains there are very prominent in the landscape and rise with steep, to some degree vertical sides up to mesa-like, quite level summits; Figs 55 and 56. Already at a distance the array of scarps and tali give evidence of the systematic alteration of strata more or less resistent to weathering.

The unconformity between the light-coloured gneissic basal series and the dark greenish-tinted sediments intercalated with volcanic rocks is very clearly visible at both the northern and the southern ends on the western side of the Mugford Tickle, the narrow separating the Ogualik Island from the mainland; Figs 52 and 57. On the post-Archæan peneplain, which here cuts nearly hori-



Fig. 57. Looking west from the northern mouth of Mugford Tickle. The iceberg in the middle of the picture is some 70 m high, the precipices to the left are about 1000 m. In the left corner is seen the upbended Archaean gneissic basal series (light). Photo the author, July 1937.

zontally the old gneisses and schists of almost vertical dipping, is laid down a quite horizontal series of conformably water-laid sediments and rocks of volcanic origin consisting principally of ashes and lavas, some of them with pillow structure and of basic, somewhat andesitic rocks, of partly spilitic composition. In the lavas thin layers of banded jaspilite, agglomerate- and ashe-tuff also occur, and the whole series of volcanic derivatives has been shot through with vertical veins of red jasper and basic dike-rocks: diabases, some peridotite and serpentine occurring as sills. Odell (692) found the volcanic rocks by far the most common; only forty feet of slate was found by him at the base of the volcanic series on the mainland side. Kranck also found some black, coal-rich slates and gray-greenish grit. At the brook from the Twin

Fall I myself found dolomitic limestone in small quantities interbedded with the volcanic rocks; Fig. 58. The vent or vents from which the volcanic material was ejected is as yet unknown.

On Ogualik DALY found the gneisses overlaid by a sheet of diabase, about fifty feet in thickness, upon which are piled slates, quartzites, rather crystalline limestones, and sandstone with interbedded basic rocks. All the sediments and intercalated basic rocks have low dips, which give an explanation of the plateau-like character of the relief, as dissimilar to any other on the coast. A magnificent section of the whole stratified series can be studied as the bends plunge into the deep water on the southwestern entrance of the Tickle, Fig. 59. The total thickness of the stratified series has here been estimated at about twenty-five hundred feet (200).



Fig. 58. Looking over the valley with the Twin Falls in the Kaumajet Mts. In the foreground, in the river valley, is the strongly-folded gneissic basal complex, and uncomformably over it lies the quite horizontal Kaumajet series, mainly of tuffs and diabase. Photo the author, Aug. 1939.

The series is however at least some 1300 m thick (694), and was once deposited fairly horizontal. To-day the surface of unconformity rises on the whole seaward. If prolonged it should pass completely over the Nanuktuk Island, Fig. 93, an outlier of the basement from which the sedimentary series has been worn away by denudation (200). Moreover



Fig. 59. The bended Kaumajet series plunging into the Mugford Tickle at its south-western end. Photo the author, July 1937.

the complex has later been broken up into big blocks by faults, and at some places there is a notable departure from horizontality; at Mugford Tickle, for instance, where the blocks have been worked up, tilted or bent, one can see down-warping of the strata; possibly the tickle itself coincides with a fault flexure; Fig. 59. On the north-west side of the Mugford Tickle the structure of the rocks is that of a flat syncline with a north-west—south-east axis, crossed, west of the waterfall by a transverse warp, and it is evident that the gneisses have participated in the folding and faulting of the sedimentary cover, and we have thus to deal with a slight but real folding of the rocks; Fig. 60.

All round the series has been eroded down to the very roots, and cliffs now rise almost in terraces with almost vertical scarps, owing to the relatively faster weathering out of some less resistant strata under the diabase cover at the top. The morphology has later been rejuvenated by water erosion and local glaciers; cf. the big cirque at the foot of the Bishop's Mitre; Fig. 61, a scene in its way unrivalled in Labrador. The landscape is thus very picturesque and impressive; Figs 62 and 58, especially at Cape Mugford where the high pile of sediments looms up in solemn grandeur; Fig. 55.

The northernmost outlier of this sedimentary formation is the imposing 'Finger Hill' of the charts, a long narrow plateau, perhaps two thousand feet in height, the name being derived from a large number of towers or pinnacles resulting from the dissection of the edges of nearly horizontal strata (200).

From the descriptions given by CABOT, PRICHARD, Mrs. HUBBARD and LOW it seems quite probable that erosion remnants of the Kaumajet-formation have been preserved towards the west and south-west from the Kaumajet Mts (near the Assiwaban River?, Bridgeman Mts? near George River; cf. also 692). The Bridgeman Mountains stand out to the river quite distinct and separate, like giant forts, says Mrs. HUBBARD, and referring to LOW suggests that the hills have the characteristic Cambrian outline and the formation might extend eastward from the Kaniapiskau Lake to the George River. Cf. Fig. 33.

The geological age of these beds is doubtful. Considering the true sediments interstratified in the volcanic beds on Ogualik Island found already by DALY,



a.

b.

Fig. 60. The southern shore of the Mugford Tickle peninsula showing foldings in the sedimentary beds: a. slight anticline in the interior. b. syncline of the outer part. Photo the author, Aug. 1939.

it would seems plausible to connect the Kaumajet beds with the Ramah beds in the coastal belt of the Torngak Mts. Also ODELL says (692) that with the Ramah series can be linked the volcanic and sedimentary series of the Kaumajet Mts, which seems to be approximately equivalent in age to the former. He regards them as late Proterozoic and corresponding with the Animikean (upper-Huronian) and the Keweenawan rocks of the Canadian Shield (692). However, the extrusive lava sheets and the intrusive trap dikes of the Kaumajet series might seem to make the genetic connection doubtful. Yet taking into consideration the great likeness of the water-laid sediments of the



Fig. 61. The great cirque-valley toward the north from the Bishop's Mitre in the Kaumajet Mts. Looking from the north (275).



Fig. 62. View of the Bishop's Mitre from the south. It is composed of two peaks, between which is a gigantic ravine about five hundred feet in depth (275).

two series, and the fact that they resemble no other series to be found in eastern Labrador, it seems nearer the truth to identify them chronologically as belonging to a post-Grenville formation. Several explorers have expressed the opinion that this formation is of younger Huronian age. This will be clearer later.

The analogous sedimentary beds of the interior and western parts of the peninsula.

Descriptions are to be found of the inner and western parts of Labrador which indicate that sediment series of the same nature occur in several places on the peninsula. These extensive stratified covers appear also to bear the same relation to the crystalline basal complex as that of the Ramah-Kaumajet beds.

Round Richmond Gulf on Hudson Bay is to be found a series which probably corresponds to the Ramah and Kaumajet sediment series. The conformable sediments dip seaward 5° to 45°, and are distinguished by a cuesta topography, with cliffs on their eastern side rising 1500 feet above sea level (591 a). Near the Great Whale River the rocks consist of red and grey sandstones and conglomerates, bedded grey quartzites and hard sandstones, black shales, argilites, with layers of red jasper and hematite, calcareous chert beds sometimes brecciated, blue and bluish-grey limestones and dolomites, greenstones and quartz-porphyres, resting unconformably upon the Laurentian gneiss; the dip seldom exceeds 5°. The landscape round Little Whale River reminds one very much of the Kaumajet Mts; see picture in 56.

In different places in the middle part of the Newfoundland-Labrador area other remains of such sediments have been discovered: ripple-marked and cross-bedded quartzites, and sandstones interbedded with bands of shale, chert, limestone or dolomites intercalated with lava beds and tuff layers (588). Such places are the Lake plateau, the lower portion of the Hamilton River valley and the surroundings of the big knee of the Naskaupee River (995).

Where the Koksoak River, in a valley two or three miles wide and 500—600 feet deep, cuts through this series it consists of sandstones, shales, ferrugineous cherts and some limestone and dolomite dipping north-east or north-north-east at angles from 10° to 80°. The outcrops form cuestas with steep faces toward to the south-west, and gentle slopes on the opposite side, apparently coinciding with the dip of the rocks. All the cliffs were found with

caps of hard rock, probably trap, with rusty shales beneath, and on the steep side the hard capping rock often projects beyond the softer sediments, thus forming overhanging cliffs. The outcrops form roughly parallel series from a quarter of a mile to two miles apart; Low noted sixteen of them in as many miles (588).

On the post-Laurentian peneplain in the interior of the peninsula, laid down on the banded, migmatitic gneiss (Grenville series?) with great unconformity, was a widely spread sediment series, called by Low the Kaniapiskau series. Remains of this are to be found on the lake plateau, where they consist of conglomerate, sandstone, quartzite, dolomite, greywacke slates, chert and volcanic flows. Thick beds of hematite are associated with these rocks around Petitsikapau Lake (588). The sedimentary complex has been almost strongly folded and faulted by a stress from a somewhat north-east direction. The strike in the south-eastern part of this folding complex is, round Birch Lake, north to south to north-north-west, but it veers over to north-west in the northern parts, the lake's contours indicating to some extent the direction of the strike. The dipping varies but is almost steep. This complex is intruded by stocks and dikes of syenite (granite), gabbro and diorite.

The flat-lying sediment series of Lake Mistassini (dipping from 4° to 15°) and the red sandstone and shale at Mishikamau Lake too (?) belong maybe to the same series; similar cuesta features as mentioned above have developed on the late pre-Cambrian round these lakes (173).

Taken all together, the descriptions of these remainders of sedimentary series, of water-laid and pyroclastic deposits, indicate that at least the northern parts of the peninsula have once been covered by a large sedimentary formation intercalated and covered by volcanic flows. Bell was perhaps the first to refer to the Huronian age these beds at Richmond Gulf and between Ramah and Nachvak (56), and I think there is no reason to reject his opinion until more detailed investigations compel us to accept another.

My own studies of the composition of the morainic cover on the Lake Plateau revealed blocs and debris of volcanic rocks in abundance, e.g. pillow-lava, water-laid tuffs, jaspilites and jaspis interstratified with thin layers of hematite, etc., all very similar to the corresponding rocks at Kaumajet. But those same rocks also occur as pebbles in a conglomerate which I found only in great blocks. This may indicate that in the bedrock in the north and north-west of the Lake Plateau there are series which correspond to the Kaumajet (Cape Mugford) series. But the composition of the conglomerate indicates that there may be also a younger — interformational ? — series of sediments of

Algonkian type. The Algonkian period seems to have been a time of continued peneplaination throughout the pre-Cambrian shield. Yet slight down-warping of parts of the plain took place, allowing the sea to enter and form great shallow gulfs like the present Hudson Bay and Ungava Bay, interrupted by temporary reverse movements. The floodings of the former were followed by sedimentation, the withdrawals only caused some of the deposits to be eroded (174 a). Does the conglomerate of these blocks belong to such a sedimentation facies ? Not until the region between Cape Mugford and the lake plateau has been investigated will there be any possibility to judge whether the suggestion made above is correct.

The Wapussakatoo series, west of the Ashuanipi Lake (312), with its quartzites, sedimentary schists and abundant carbonate and oxide iron-bearing formations may probably belong to the above supposed older group.

These late pre-Cambrian sediments are in many places still comparatively undisturbed. However, it has been generally found that the Algonkian era was brought to a close by folding and mountain-building in the geosynclines. The mountain ranges which came into existence by the folding here are considered, in the present state of our knowledge, to have been more localized than those formed at the end of the Archaean era. Such a folding zone stretches in the interior of Labrador across the Koksoak River below and above its junction with the Stillwater River, in a direction about south 25° east to the area of Lake Petitsikapau and Lake Ashuanipi on the one side and Lake Mishikamau on the other (cf. above and 174 a) and probably on to the Naskaupee River, where Wallace (995) found patches of what is probably a corresponding sedimentary series. The central axis of this zone lies thus between Lake Petitsikapau and Lake Mishikamau. All the strata of this folding zone are highly disturbed, folded and compressed and have been forced to assume steeply tilted positions with dips of 45° to 90°. In the centre the folding of the bedded sediments has been very intense; faults are numerous. Shales and limestones which elsewhere are unaltered have here been metamorphosed into schists and crystalline limestone, the slates have formed andalusite and staurolite schists and the conglomerates and agglomerates have been partially laminated. Granites intruded the metamorphosed sediments here and there.

The folding undoubtedly gave rise to a prominent mountain range to which Cooke has referred as Labrador Range (174 a, p. 139). This is not to be confused with Kranck's 'Labradorean folding', *viz.* the 'Labradorean mountain chain' (535, p. 28 sq.).

The third cycle thus started with the levelling out of the 'Labradorean Mountain Chain' and closed with the folding up of the 'Labrador Range' in the interior, which was probably synchronous with the comparatively slight foldings of the Ramah beds and the disturbances in the Kaumajet beds. However, there is also another possibility of later folding to reckon with (Cf. p. 123).

Correlations with Canada and Fennoscandia.

The Kaumajet series is probably Huronian in the Canadian geological succession, Odell has pointed out (692). Gill and his companions stated that the Wapussakatoo series greatly resembles the older Huronian formations of Lake Superior. If that is the case, one is inclined to attribute the Kaumajet series stratigraphically to the older Huronian, and from this it would follow that the younger sediments in the interior folded up in the Labrador Range are of late Huronian age.

I have already suggested (914) that the 'Labrador Range' may correspond very nearly to the Algoman folding and must therefore agree with the later assumption of Kranck (536 c) that the Ramah and Kaumajet beds are of Huronian age.

The superficial resemblance between the rocks of the metamorphic facies included in the 'Labrador Range' and those of the 'Gotho-Karelides' in Fennoscandia is very striking. The habitus of the sedimentary rocks after the metamorphosis even shows similarity with those found in the roots of the former Gotho-Karelian mountain chain in Finland. It appears therefore to me not improbable that this ancient mountain chain will prove to correspond chronologically very nearly with the Gotho-Karelides. However, it is not legitimate to draw stratigraphical parallels between regions so distant from each other as Finland and Labrador only on the basis of typological similarities in the rocks. The exact identification of the chronological position of the Kaniapiskau series in the Fennoscandian system is therefore a question for the future.

Minerals.

This widespead formation is of considerable practical interest owing to the amount of iron ore it contains, principally hematite but some magnetite also. As the investigations are not yet complete it would be premature to express here a definite opinion about its practical value (588, cf. 261). Three

principal ore-bearing districts have been discovered: 1) between Attikamagen Lake and Petitsikapau Lake, 2) at Ruth Lake in the north-western part of the Lake Plateau and 3) in the surroundings of Sawyer Lake, north from Birch Lake. It has been calculated that in this last the ore, which is poor in phosphorus, contains 64 % iron, and the amount is estimated at billions of tons (cf. preliminary descriptions in 261 and 919). Cf. p. 801 sqq.



Fig. 63. Double Mer sandstone with current bedding. Northern shore of Double Mer (536).

The sandstone beds of Double Mer and Lake Melville, etc.

During a long period of erosion, the 'Labrador Range' mountain chain was in its turn worn slowly down to the very roots, and in its place a peneplain with some monadnocks here and there came into existence. An epoch of intense desert weathering followed, during which enormous masses of angular gravel and sand were formed by mechanical decomposition of the rock-ground. Probably there were still some remains of the Labrador Range forming mountainous areas with wide, flat valleys. The streams issuing from these mountains and the sheet-floods laid out great alluvial fans in the local depressions and at the mouths of the valleys. From these 'molasse' deposits arose heavy masses of

red, arkose sandstone, with some interbedded sandstone conglomerate and some interstratified thin sheets of slate; cross-bedding is not seldom observed in the sandstone, cf. Fig. 63. Such deposits are to be found to-day in two big fault-graben, the one on the northern shore of Double Mer and the other on the north-western shore of Lake Melville and on Green Island. It may be that the sandstone on the bottom of the Mishikamau Lake (588) on the so-called Lake Plateau, as well as on the bottom of the Hamilton River's valley some distance from the mouth also belongs to this sedimentary complex. South-west from Sandgirt Lake this (?) formation is penetrated by a granitic dike.

In the Lake Melville basin the sandstone layer is at least 150 feet thick; the base has not been found. The sediment has not been discovered on the margin of the adjacent gneissic basal complex on which the sandstone was deposited, and this suggests that at least 300—400 feet of differential erosion may have occurred since the down-warping. The true thickness of the sandstone formation was therefore probably >500 feet, and may even be 1000 feet. The same assumption may hold good for the sandstone layer on the northern shore of Double Mer.

Very little is known about this fourth pre-Cambrian cycle, which was characterized in Newfoundland-Labrador by intense degradation.

Correlation with Canada and Fennoscandia.

This sandstone has nowhere been folded. It has only been faulted down in grabens, bounded by straight, quite parallel fault planes and thus protected from denudation. It seems most probable that the down-warping did not take place until Tertiary time, a supposition which does not exclude the possibility of the rupture zones being predeterminated much earlier and only revived in connection with the ubiquitous crustal movements in the Neogene. The inconsiderable degree of its thorough deformation is evidence that the sandstone is a relatively very young formation. Taking into consideration its stratigraphical position and completely unfolded state, the red sandstone series may henceforth be referred to the latest pre-Cambrian red 'Molasses', which in every pre-Cambrian terrain in the northern hemisphere marks the termination of that era. This interpretation is held by recent writers (174 a, 535, 536) and according to it the sandstone of Double Mer and Lake Melville type must correspond to the Keweenawan of Lake Superior like the Jotnian of Fennoscandia.



Fig. 64. Weathered nordmarkit rocks on the south-western slopes of Ragged Island. Photo the author, July 1939.

The 'Labrador Range' formation and the Double Mer — Lake Melville series seem to the present writer to offer the most striking similarities to the Gotho-Karelian and the Jotnian of Fennoscandia, and might be a fitting subject for a future detailed comparison of the Fennoscandian and Laurentian areas.

Eruptive rocks of undeterminable age but youthful habitus.

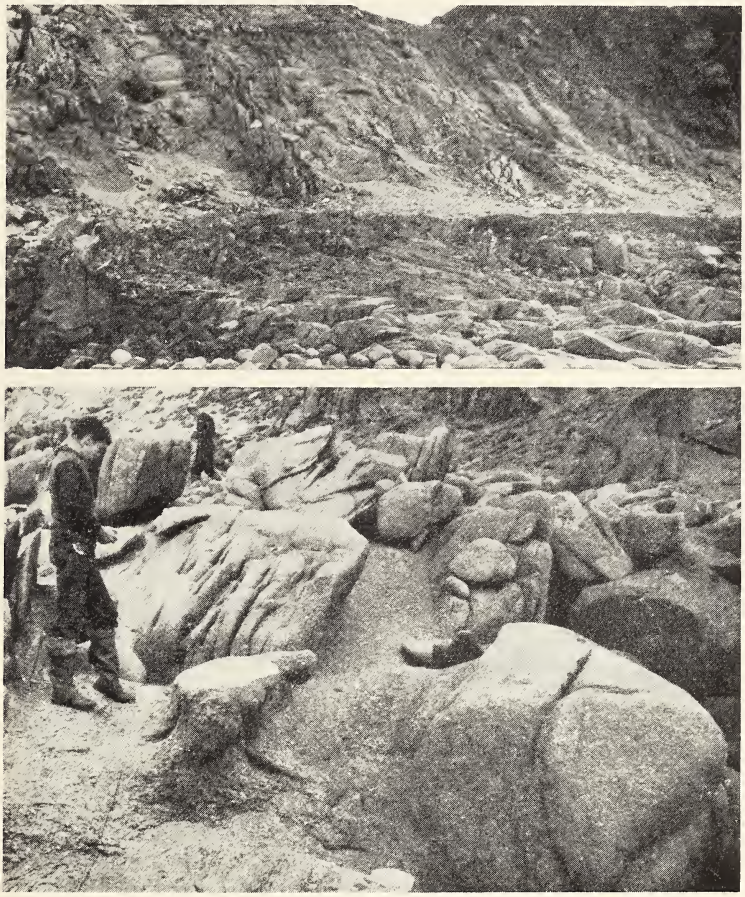
Before leaving the pre-Cambrian series, it should be mentioned that scattered outcrops of comparatively young eruptive rocks penetrating the basal complex occur at the seaboard between Cape Harrison and the Nain archipelago.

In the coastal region, between Hamilton Inlet and Aillik, KRANCK discovered a whole complex of young eruptive rocks: granites and syenites. They seem to form a whole series of potassium-rich rocks, represented by granites, monzonites and pure syenites of nordmarkit type.

That which first attracts attention are the red granite rocks of the r a p a k i v i type at Cape Strawberry near Makkovik. With the surrounding rocks they form eruptive breccias. These rocks are prominent already in their natural appearance because they give rise to steep, beautifully rounded forms, as for instance at Kingi-tok-suak or Ragged Island; Fig. 64; Uigoklialuit, Dunn Island, Ironbound Island, Kingitok Island south-east from Hopedale, south-west of Itplik in Nunasugoak Bay (Nain), etc. Their deep red surface with its scanty dark minerals, are also noticeable in these areas from intensive weathering as in Finland; Fig. 65.

The question of the relative position of the syenite of e.g. Ragged Island to the rapakivi granite at Strawberry Point is not clear.

All the formations at the central coastal area north of Cape Harrison are penetrated by rather flat-lying systems of dikes of dark rocks, which arise



a.

b.

Fig. 65. a. The highly weathered nordmarkit rocks on the western side of Ragged Island. b. Near picture of the same. Photo the author, July 1939. Cf. Fig. 303.

from a younger intrusion than the Archaean basic stocks and dikes mentioned above from the surroundings of Hamilton Inlet; the latter appear however also here as porphyrites and peridotites, and associated metabasites.

Between Hamilton Inlet and Hopedale numerous flat-lying sills of lamprophyric composition can be noticed, in some places with high potassium content as on Double Island and at Turnavik; Fig. 66. The appearance of these dikes in the same area as the syenites may indicate a genetic connection.

In the same district KRANCK found the interesting Aillikite-dikes, at Aillik, Turnavik and Conical Island at Manak. The chemical composition of the Aillikite (536) (20.66% SiO_2 and 10.43% CO_2) is interesting, being much



Fig. 66. Lamprophyre dikes south of Aillik (536).

like that of the Alnöite. They are also considered as lamprophyres deriving from the syenites mentioned above.

The stratigraphical position of those only slightly altered eruptive rocks, granites, syenites and related lamprophyric dike rocks is not clear. They cannot be related to the anorthosites, nor have a position under the Ramah or Kaumajet beds, because they are found unaffected by tectonic movements. On the other hand, a number of petrological facts make it probable that they are younger even than the Keweenawan sandstone of Lake Melville and Double Mer (535, 536). The settling of their definite position is a matter for the future. They form a rock association of great petrographical interest, and give strong support to the assumption that an alkali-rock province may occur on the Labrador coast. KRANCK's idea is that the syenite series in the

Makkovik district is a good starting point for discovering a connection between the coasts of Labrador and that of south-west Greenland, which face each other.

All these dikes are cut through by the normal t r a p d i k e s.

One of the most notable phenomena of the geology of the Labrador coast is the continuous prevalence of t r a p d i k e s along the coast from the Straits of Belle Isle to Nachvak (200). The numerous remains of these volcanic channels indicate a great extension of volcanic action just in the present coastal belt. Almost they are typical diabase dikes, 2—50 ft, seldom more than 200 feet wide, dipping generally vertically and extending several miles. The strike of the different dikes varies very much. One of the most prominent is the enormous dike which forms a row of narrow islands reaching more than 10 nautical miles out into the ocean in a north-north-east direction from Blackguard Bay towards the east of Sandwich Bay; Fig. 67. Most interesting is the nearly horizontal-lying system of trap dikes of Striped Island; Cf. Figs 38 b, 94, 127 and 327.



Fig. 67. The outcropping diabase dike forming at N 30° E a row of narrow islands, Long I., Tinker I., etc. at lat. 53° 35′ W. The strike of the basic gneiss is nearly parallel with the longer edge of the picture. Aerophoto the author, July, 1939.

The basic dike-swarms in the Torngak Mts district contain, following Odell, dikes of different age and composition. There are dikes of doleritic or diabasic composition, but some are ultrabasic pyroxenite. The trap dikes between Hebron and Nachvak are usually vertical, often as much as three hundred feet in breadth; they are particularly well-developed on the flanks of Mt Blow-me-down. The diabasic dikes in the Nain area too belong to different petrological types, as shown by Wheeler (1019): one in the northern part of the area, another in the Hopedale region; in view of the absence of a geographical limit between the types, it seemed to him probable that they have originated by differentiation from a single magma. According to Kranck, the diabasic dikes in the Hamilton Inlet—Hopedale area also belong to several generations, and he thinks that some of them are synchronous with the Kaumajet diabase. Their minerological composition also varies, both olivine-bearing

and olivine-free diabases are known to be there, and coarse porphyric varieties with big feldspar crystals have also been observed. The diabase dikes belonging to the younger eruption suite appear chiefly north of Hamilton Inlet, while the older ones predominate in the coastal districts between Hamilton Inlet and Domino Run. At Batteau and Cartwright the old metabasites are cut across by the younger diabase dikes which do not show any indication of having been affected by regional metamorphose.



Fig. 68. Fragment of compressed pegmatite in a diabase dike at Paks Harbour (536 b).

The diabase dikes belong to the youngest rocks in the region, since they cut every other rock of any considerable area, while no other rocks have been found cutting them. In the dikes fragments of their country rock have been found at some places; Fig. 68.

The connection between the youngest trap dikes and the Keweenawan sandstone of Labrador has not yet been made clear.

As one enters Henley Harbour in Chateau Bay at the Straits of Belle Isle, the islands have somewhat the appearance of a fortress (29, 434); cf. Figs 69 and 12. The lower parts are built up by the gneissic basal rocks whereas the upper portion consists of massive basalt cover, 50 feet thick, supported by an aggre-

gation of quite perpendicular basaltic columns, of which the greatest height is 25 feet, the base of the pillars being 180 feet abowe the water. One of them, the 'Devil's Dining Table', is a flat, basalt cover, with columnar jointing; Fig. 69. Does this basaltic flow correspond to the Jotnian diabases of Fenno-scandia and is it thus post-Keweenawan? Or is it, as BELL considered, of the same Cambrian age as the sandstone beds on the northern shore of the Straits of Belle Isle? Or has its eruption taken place concomitantly with the movee ments which arose in late-Tertiary time? It would be premature to answer



Fig. 69. The 'Devils Dining Table', a basalt cower with columnar jointing at Chateau Bay (536 a). Cf. Fig. 12.

these questions definitely, but the last of these suppositions seems not improbable.

These dikes show that Labrador's Atlantic coast, the continental border, has at many different periods been a restless zone where the earth's crust has been broken and again welded together by masses of lava. Even in our time the seismic phenomena give evidence of the lability in that zone. Another fact which indicates that the vertical displacements at the coastal edge extended to a comparatively late period is the peculiar weathering observed in the quartzite-gneiss on Bear Island at Cape Harrison This rock was clearly disintegrated by the effect of thermal water in rather recent times (536 c). It is evident that this water issues just from fault fissures reaching towards the great depths at the continental slope. Young breccias at the coastal edge are an indication of the same events (536 c).

Palaeozoic Series.

In the series mentioned above no fossils have been found, and their relative age can only be determined by their contacts. Still, Palaeozoic fossiliferous rocks are not completely lacking in Newfoundland-Labrador.

Cambrian rocks

occur on the southernmost strip, on the north-west shore of the Straits of Belle Isle, where is visible a long tabular masse of reddish sandstone and grey limestone standing out in bold cliffs and forming long, verdure-clad slopes from Pinware Bay towards the south-west to Bradore Bay. The extension of these Labrador series has been exaggerated on the geological maps; it reaches only a distance of about 23 km along the coast. It is a fringe of lower-Cambrian sediments resting upon Laurentian granite with a contact of slight relief and dipping gently south-eastward into the Straits. A maximum thickness of 470 feet has been measured, but as the top of the series is eroded, the original thickness cannot be determined; the thickness of the Cambrian series across the Straits of Belle Isle is 886 feet and it must be referred to this series. Schuchert and Dunbar consider that the Cambrian formation may never have extended far into Labrador, probably not much farther than it does now — say about 10 miles from the shore of the Straits of Belle Isle.

The bottom beds of the Labrador series consist of red and white non-fossiliferous, continental sandstone, with some vertical worm tubes, known as *Scolithus linearis:* Bradore formation. The upper part which follows conformably, is composed of fossiliferous marine limestone and shale: Forteau formation. The most striking members of this formation are the reefs of *Archaeocyathinae*-limestone which have no definite horizon. To this were fastened numerous, thick-shelled Brachiopods and rare Capulite gastropods (*Helcionella, Salterella*) are common, also small *Olenellus.* There are no thick shale zones, although muds are most frequently the filling of the depressions between the more quickly growing reefs. Landwards the reefs become thinner and the limestones are more evenly bedded and muddier. These phenomena are in harmony with the theory of barrier reefs in front of low land. Towards the land, the basal sandstones become coarser; they were spread upon the Canadian Shield in front of the advancing Cambrian sea.

An analysis of the faunules from the various horizons reveals no localization of species other than that indicated. Charles D. Walcott has determined the following species: Archaeocyathinae: *Archaeocyanthus profundis* Billings, *Spirocyathus atlanticus* Billings, *Petropharetra* sp.; Brachiopoda: *Obolella chromatica* Billings, *O. crassa* Hall, *Micromitra* (*Paterina*) *bella* Billings, *M.* (*P*) *labradorica* Billings, *Kutorgina cingulata* Billings, *Nisusia* (*Jamesella*)

oriens Walcott; Gastropoda: *Stenotheca* sp., *Helcionella elongata* Walcott, *Hyolithes billingsi* Walcott, *H. communis* Billings, *Hyolithellus micans* Billings, *Discinella* sp. ?; Cephalopoda: *Salterella rugosa* Billings, *S. pulchella* Billings, *S. obtusata* Billings; Trilobites: *Olenellus logani* Walcott, *O. thompsoni* Hall, *Corynexochus* (*Bonnia*) *parvulus* Billings, *C. senectus* Billings, *Conocephalites miser* Billings. The best collecting ground for fossils is on both sides of Forteau Bay and between this place and Anse-à-Loup Bay.

This formation shows no noticeable deformation by mountain-folding.

Ordovician rocks

It appears that Ordovician and perhaps Silurian formations are represented in the vicinity of Cape Chidley (535, p. 4, Note). At the shore, at the head of one of the bays, five or six miles south of the eastern extremity of MacLelan Strait (Grenfell Tickle) Ordovician-Silurian fossils are said to have been found in limestone (581). I have no precise information regarding this.

Along MacLelan Strait there are, in the morainic gravel, rugged pieces of limestone and schists containing Silurian fossils, and it may be assumed that these have been brought thither by the land ice from the west side of Ungava Bay (545).

In Ordovician time, submergencies alternating with emergencies took place at the Labrador coast of the Gulf of St. Lawrence (Anticosti-Mingan area) and continued at least until mid-Silurian time (832 a, 967, 967 a). From the composition of the beds which were deposited in shoal water it has been inferred that the land to the north was very low, much like Florida to-day (174 a).

Certain writers have put forward the hypothesis that Palaeozoic rocks have also covered the central parts of Labrador. It must therefore be specially stated here that as yet there are no proofs of such a supposition. — In passing, however, it may be mentioned that Father Arnaud, who in 1853 started up the Manicuagan River and wintered among the Naskaupee Indians, describes a copious spring of salt water issuing from the foot of a high mountain (434, 490). Nothing is known of the nature of this mysterious salt spring (Cf. 212, 821).

No deposits have been discovered in Labrador from the succeeding periods until the Quaternary. An approximate idea of some of the principal phases in the subsequent development is, however, obtainable from a consideration of the geological history of the surrounding countries.

The post-Silurian folding systems of North-eastern America and Newfoundland-Labrador.

Newfoundland is the nodal point of intersection of the two master structure lines of eastern North America.

The land of the North American continent south and south-east of the St. Lawrence River and east of the Hudson River and the Champlain Valley is to be regarded as one vast geological unit, which has been referred to as Greater Acadia. North and north-west of it lies its foreland, the Canadian Shield, the resistant buttress towards which Greater Acadia has moved. The eastern part of the foreland is formed, as already pointed out, by Labrador.

East and south-east of the foreland once lay the St. Lawrence geosyncline. This trough, in which the Labrador series last mentioned, Cambrian to Silurian, were deposited, was certainly in existence as long ago as the earliest Cambrian; it is even possible that the geosyncline was established as early as Proterozoic time. In the geosyncline, sediments were deposited during the Cambrian, Ordovician, Silurian and early Devonian periods. During Devonian time the trough was transformed into a positive mass.

The St. Lawrence geosyncline was separated on the south-east from the narrower and shorter Acadian geosyncline by the narrow New Brunswick geanticline. The Acadian trough formed the outermost structural element, the border-land of the present Nova Scotia and Newfoundland, and apparently extended further eastward than the present 600 ft. isobath which to-day defines the edge of the continent; most of this border-land is now faulted and down-warped into the depths of the Atlantic. The fossils of the St. Lawrence and the Acadian seaways show that both had connections with the European area.

The mobile mass of Greater Acadia was widely deformed by orogenic movements at three epochs. Towards the close of the Ordovician, the Taconian orogeny deformed the deposits of the St. Lawrence geosyncline. In western Newfoundland this crustal movement expressed itself mainly in sliding and thrusting; along the south-eastern shore of the St. Lawrence River the thrust border is formed by Cambro-Ordovician strata. The Acadian orogeny of the later Devonian can be traced across Newfoundland; it was most intense in the Acadian geosyncline and folded almost the whole of Greater Acadia into permanent mountainous dry land. The Appalachian revolution of Permian time has folded Upper Carboniferous strata in Nova Scotia, but in Newfoundland the limited distribution of the Carboniferous and the absence of all later formations with the exception of some marine Pleistocene makes it difficult to evaluate the importance of this orogeny.

After the Appalachian revolution there does not appear to have been any epoch of disturbing diastrophisms in Greater Acadia and its foreland to the north. Both were subjected to long periods of erosion which continued in Cainozoic time and the land was slowly reduced to a peneplain, recorded *inter alia* in the plateau-like surface of the Long Range of Newfoundland and the other vast plateaus. After the uplift in pliocene (in the following) the plateau surfaces were dissected by the rivers, and the areas of weak formations were reduced to

lowlands, now partially submerged. The Gulf of St. Lawrence was probably such a broad lowland resulting from this erosion, which was not submerged until late Pleistocene time. Cf. p. 226 sq.

This explanation of the geological evolution of the mobile Greater Acadia gives also some hints regarding the geological history of south-eastern Labrador, west of the folding zones. Of course, it is only slightly probable that these orogenic diastrophes should have passed away without rebounding reaction changes at the borderland of the shield; on the contrary, it is most likely that thrusting and faulting, reaching even up to the surface of the earth's crust, must have occurred, and they must have distorted the shield's border (174). From rather early Palaeozoic time to the Quaternary, the Labrador peninsula



Fig. 70. The anorthosite ridge on the northern shore of Tikkoatokak Bay at Tingit. Near the sea are seen some raised beaches up to 97.0 m marked by snow drifts. Photo the author, July 1939.

was land. It seems not impossible that the Domino gneiss zones (p. 88) as well as the thrustings from the south-east in the Nain district, Fig. 70, are to be attributed to the Taconian orogeny. Still, the proof of this is a matter for future investigation.

* * *

For information regarding the bedrock geology in the coastal districts with reference to the pre-Cambrian, I refer the reader especially to details given in the works of Steinhauer (892), Lieber (575, 576), Packard (715, 716), Bell (52, 52 a, 53—56), Bayfield (48 c), Low (587, 588, 588 d—594), Daly (200, 201, 203), Kindle (523, 525), Coleman (155, 157, 161), Wheeler (1019—1022), Odell (690—694) and Kranck (535—536 c). The first systematic investigation of the rock-ground geology of the north-east coast was made by Daly (1902, 1922) and continued by A. P. Coleman on behalf of the Geological Survey of Canada. Their work was the starting-point of the

investigation carried out by ODELL and WHEELER 2ND of the structural geological and the glacial history of Northern Labrador. SCHUCHERT and DUNBAR as well as TWENHOFEL give information regarding Palaeozoic rock-ground. For the geology of the Lake Plateau we have to remember the fundamental work of LOW (587—594) and the research of GILL, BANNERMAN and TOLMAN, and may expect an extensive description by Dr. J. A. RETTY, who has been for several years leader of the large-scale prospecting carried out by the 'Labrador Mining and Exploring Company'.

The main lines of the Physiographical Development of Newfoundland-Labrador in pre-Quaternary time. A retrospective summary.

The geological history of Labrador, as presented in fragments above, is an excellent illustration of the instability of the earth's crust which is apparently so rigid. Let us now review in their main lines some characteristics of the physiographical evolution and especially the stages through which the land had to pass before the peneplain came into existence. As Labrador has participated in the physiographical history of the whole Canadian Shield, our conclusions will also hold good for relevant parts of it (cf. 173, 174 a).

Regarding the oldest periods, for instance the K e e w a t i n, they were probably marked on the Shield by a folding of moderate intensity followed by a period of erosion from which resulted a mountainous, rather mature, topography.

In the wide valleys and flats were laid down the great bodies of sediments, composing the T e m i s k a m i n g s e r i e s, in part sub-aerially formed, alluvial fans (conglomerates and sandstones), in part either in lakes or arms of the sea (graywackes, quartzites and slates). The present mainland of Labrador must have extended very far toward the east.

The Temiskaming period was ended by a very intense folding. It is evident that an area with great mountain ranges, the L a b r a d o r M o u n t a i n C h a i n, came to occupy Newfoundland-Labrador. Its average trend was north-north-west. Large adjacent areas became up-warped above the base level.

This folding was succeeded by a long period of erosion, during which the mountains were reduced to almost featureless plains, lying practically at sea level: the p o s t-A r c h a e a n or s u b-H u r o n i a n s u r f a c e. After this Huronian stage had been reached, several gentle down-warpings, alternating with upheavals, occurred. Where the sea flooded the low, flat surfaces, sediments were laid down in the shallow bays (Ramah and Kaumajet series, Kaniapiskau series), whereas these sediments were subjected to widespread withdrawals and erosion when the land was lifted above the sea level. The sediments were however only partly eroded away, partly they became covered with material from

volcanic extrusions, which effusive rocks with alternating tuff beds and lava sheets seem to have covered at least the northern half of Newfoundland-Labrador. In the western part of Newfoundland-Labrador and the surrounding district submergencies and emergencies may still have alternated, and in the shallow troughs the upper-Huronian sediments were deposited and interbedded with effusive material from the volcanic outbursts; ash layers and thick flows of basic lava and interjection of sills and dikes of diabase were deposited.

The igneous activity was followed by folding and the intrusion of some granite. The Labrador Range originated, forming real alps and stretching from the western side of Ungava Bay through Mishikamau Lake. Perhaps the Wapussakatoo and the Naskaupee River series were upfolded at the same time. In the central part of the Labrador Range the folding was most intense and seemingly of Alpine type, whereas at the sides — e.g. the Ramah and Kaumajet beds and the Richmond Gulf beds, etc. and the Mistassini limestone — the primary position of the water-laid sediments and effusive rocks was not at all, or only to a comparatively slight degree, affected by the folding, which was here of the Jura type. It is most probable that during the mountain-building process the whole land surface, or at least the central parts of the peninsula, were elevated to a considerable height above sea level. The land surface must therefore have extended far beyond the present limits of Newfoundland-Labrador.

When the late-Huronian orogeny closed, the uplifted mountainous region was subjected to renewed weathering and perhaps an arid erosion cycle set in. The products of the former filled out depressions, and by this process the coarse, clastic Keweenawan beds came into existence. The base-levelling of the great sub-Cambrian peneplain continued into post-Keweenawan time. By late-Algonkian time the greater part of Newfoundland-Labrador appears to have become a low and very flat plain.

The Palaeozoic sediments were laid on a surface probably flatter than the present. In the area where the Straits of Belle Isle and Newfoundland are at present situated the shore was unstable, two submergencies of the border-land in lower and upper Cambrian occurred, separated by an emergence in middle Cambrian.

In earliest Ordovician, the present St. Lawrence border-land participated in a new submergence registered by its deposits in western Newfoundland and in a few places on the north shore of the Gulf of St. Lawrence; e.g. in the Mingan Islands. The Ordovician closed with a widespread uplift of Labrador.

In the Devonian, the Labrador area must be supposed to have been raised still more and fairly high above sea level, at the same time being tilted southward (174 a). The end of the Devonian was marked by folding, faulting, igneous intrusion and mountain-building in Newfoundland. It is most probable that these processes had a reaction in Labrador too (the rapakivi granites and syenites? the Domino gneisses?).

It is obvious that the long erosion period from the end of upper-Cambrian to late-Tertiary time, during which Newfoundland-Labrador was lifted above

sea level, resulted in a still deeper erosion and peneplaination. It is also most probable that the Shield was unaffected by diastrophic movements during the age-long period from the end of the Devonian time to the comparatively recent uplift in Pliocene.

On the other hand, the late-Tertiary was a time of great disturbances all round the Atlantic. The Shield now suffered a new uplift, together with much warping and faulting. The late-Tertiary peneplain of the Canadian Shield was lifted high above the sea, most of it higher than at present. Great areas of its northern parts, however, were intermittently and locally down-warped to form in the centre the great depression that later became Hudson Bay (173, 174 a) and farther east the Ungava depression. For the Labrador peninsula this uplift is proved by the many deep river valleys with which we shall soon become acquainted.

In the account given above much is necessarily left open to question. The most salient features of the cyclic development of the Labrador peninsula, however, already allow the surmise that an astonishing agreement with the geological cycles of Fennoscandia will be confirmed by future research work. Here I will anticipate only one important conclusion:

The late-Tertiary land surface, uplifted in Pliocene, must be correlative with the surface which we in Fennoscandia designate the palaeic peneplain, i. e. the starting-surface to which contemporary surface forms must be referred (cf. Tanner in the Bidrag t. känned. af Finlands natur o. folk, No. 86, 1938 ed. by Societ. Scient. Fennica).

The Uplift and Dissection of the late-Tertiary Peneplain.

As suggested above it may be assumed that towards the latter part of Tertiary time the surface of Labrador, as a consequence of weathering and erosion, took on the form of a flat land where the rivers wound along sluggishly. The valleys began to have the stamp of senility, the fall of the rivers had become graded and the sides so flattened that it was perhaps difficult to trace them. The plain stretched much farther to the east than the present coast. This palaeic peneplain must have lain very near the level of the ocean when the period of general unrest in the earth's crust took place and fundamentally changed its topographical conditions.

All along the coast of the northern Atlantic strong tectonic movements occurred with unbounded faulting, down- and up-warping, some folding and basaltic eruption. These processes extended to the Labrador coast also. One of the first consequences of these processes was that the land mass of Labrador was lifted to a considerable height above sea level.

The natural question is: what proofs are there that these things really happened. The proofs lie in the character of the present relief of the valleys and mountain forms.

The valleys.

Admitting for the moment that the peneplain was uplifted more or less high above sea level, the relief energy — the erosion power of the water courses — must have increased and the plain began rapidly to undergo destruction by weathering and erosion. Vigorous streams began to incise deep, well-defined, canyon-valleys in the rock-ground, and the erosion work continued to produce its effect until the advent of the Quaternary glaciation ended it. At that time the valleys had already approached the late youth or early maturity of the erosion cycle. A drainage pattern more or less like that of the present time had been established.

The valleys in Newfoundland-Labrador only do not suffice to verify this working hypothesis. For the purpose of analysis we must take also some instances of valleys from other parts of the great peninsula. In this connection the studies made in this matter by Cooke (173, 174, 174 a) should especially be remembered; I have made use of them here.

The valleys of the northern coast of the Gulf of and River St. Lawrence.

From a narrow foreland, which, in places, may be submerged, »drowned» under the sea, a fringe of rounded hills rises to many hundred feet, sometimes to 2000 feet. These hills are merely remains of the dissected edge of an upland plateau of which the border falls rather abruptly into the River and Gulf of St. Lawrence. This upland plateau that stretched far towards the interior has been dissected and the remains form a very mountainous area, composed of rugged, rocky hills and ridges, whose summits in general have an elevation of about 3000 feet above sea level, as *e. g.* in the surroundings of the Saguenay and Moisie Rivers. The sky-line formed by these hill summits is, however, singularly level and regular, and many of the hills are, in addition, block-like, bounded by straight or curving scarps that are the walls of deep valleys, one-half to one mile wide and U-shaped. These elevated surfaces correspond perhaps to the Palaeic surface.

The plateau has been cut deeply into by a series of river valleys descending in a south-easterly direction from the plateau level to the shore of the gulf.

The best known of all these trench valleys is that of the Saguenay. This river rises in Lake St. John and flows east-south-easterly to its outlet in the gulf. The district around this lake is a lowland, having a general altitude of

between 340 and 500 feet, and bounded by an upland between 800 and 1000 feet above sea level. The adjacent upland surface here has all the characteristics of the Laurentian peneplain (229, 543 a), with narrow trench-like valleys running either east-north-east or west-north-west almost straight across the different rock formations. At the mouth of the Saguenay the average elevation of the plateau is given by Dresser as 1200 feet above sea level. The deep gorge of the Saguenay is bounded with almost vertical rocks, and for about 90 miles from the St. Lawrence, the Saguenay River is a fiord two miles wide, and in many places the bottom of the channel is several hundred feet (max. 650 ft.) below sea level. The total depth from sea-bottom to the adjacent cliff-tops has been estimated at as much as 1850 feet, the surrounding tableland rising to 1200 feet above sea level. The form indicates that the valley was excavated to a great extent by pre-Glacial stream action, and enlarged and deepened by glacial-scour. The character of thè trench indicates very rapid wear by a strong current, cutting so rapidly at the bottom that the lateral wear has been relatively insignificant. It has been easy for the stream to maintain its course against uplift, as the crushed rocks of a fault zone here have offered little resistance to rapid erosion (173, 231 a).

The rivers south-west of Lake St. John and their tributaries flow similarly in deep valleys with almost perpendicular walls (588 e) and are often broken by rapids and falls.

Differing from this system is the Gouffre River which empties into the Gulf of St. Lawrence about half-way between Quebec and the Saguenay. It has a wider valley and less steep sides, and its whole aspect is much more mature than that of the valleys of the other streams. The probable explanation of this is as follows: the Gouffre River district was not uplifted to the same extent as the rest of the plateau, therefore the Gouffre cut its bed also laterally, producing a wide and shallow valley, while the other rivers of steeper grade cut rapidly downwards forming canyons (642 a, 173).

The river valleys towards the north-east of the Saguenay are on the other hand deep and narrow. The Betsiamites flows in a valley from a quarter to one mile wide, 800—1000 feet deep below the Laurentian hilly plateau (588d). In a course of ten miles it drops fully 500 feet from the general plateau into the river valley. Its chief tributary falls into the valley by a drop of over 100 feet, as a hanging valley.

The Manicuagan River is said to be very similar in character: flowing in a valley one or two miles wide near the lower end, it cuts 500—1000 feet down into the surrounding tableland. Not until some 250 miles from the sea does the valley flare out in the general level of the plateau (588).

The Moisie River, the longest river tributary to the Gulf coast, has a course of probably 250 miles with a fall of more than 2200 feet from its headwaters to its mouth at the sea, 18 miles east of Seven Islands. A detailed description of the Moisie River and its source, Cold-water River's (Atachikamishish) valley is given by Hind (434) and I refer the reader direct to his account, one of the few concerning Labrador which is illustrated by a sketch-map. From

HIND's description one obtains the impression that the watercourse is localized in a system of fissure valleys and flows winding in huge cracks and gorges backed by steep crags or rocky hills 400—500 feet high. The width of the river in some places is reduced, in its upper course to 40 yds between rocks, reaching 800—1000 vertical feet, the river sweeping the bases of the towering, wall-like precipices of this great fissure, first on one side, then on the other. At a point about 40 miles from the sea, the stream, rising on the interior tableland to an altitude



Fig. 71. The inner part of Alexis Bay with the typical black spruce vegetation at the bay-heads (536 a).

of 2240 feet, cuts through a plateau 3000 feet above sea level (588). Drift, clay capped by sand has partially filled the lower end of the crack to a height of 70 feet (at The Forks) above the level of the river, and in these a winding channel has been excavated forming flats and points.

The St. John River is cut 200—600 feet below the surface of the plateau (588) flowing in some places in narrow gorges between vertical walls.

All these rivers have a very steep drop in general; for instance, the main branch of the Moisie River, the Cold-water River, in a course of 20 miles, falls

1430 feet. The portages are also high, e.g. the Height-of-Land Portage is 326 feet. This gives some idea of the mountainous character of the country also.

The lower ends of these valleys are »drowned» a few miles or more from their mouths, and the succeeding miles are usually of a fairly uniform grade. Above this graded section are falls and narrow gorges, but the valleys maintain a more or less uniform width. As pointed out by COOKE most of them are of



Fig. 72. Cabot Lake in the Assiwaban River (275).

one definite type: at some point or other the present stream suddenly descends from the tableland into the old valley through the narrow canyon partly filled by drift and thus pre-Glacial. Streams which were not so large, as for instance the Saguenay, have produced valleys which are neither so large nor so mature as the greater ones, and falls and rapids are still numerous in them. Their width, length and depth has been found roughly proportional to the size of the streams that occupy them to-day. A most surprising fact is that, where the rivers of the St. Lawrence rise, the plateau has a lower elevation above sea level than nearer the sea (173).

These facts suggest that the rivers forming these valleys either existed prior to the uplift of the tableland or were initiated as uplift began, and that rushing down the steep slopes towards the sea, they rapidly cut the canyons by headward erosion. The fact that even the small valleys are usually graded for some miles near the lower ends points to the conclusion that their age also approximates to that of the greater stream valleys, e.g. the Hamilton and



Fig. 73. Looking up the north branch of Saglek Bay (275).

Saguenay valleys. They must therefore date from the uplift of the plateau or before.

— We find therefore on this part of the coast a perfect homology with the river valleys cutting the archaean plateau south from the Varanger, Petsamo and Murman coast in northernmost Fennoscandia, which I have described earlier (TANNER, op. c. 1938). —

The surface of the dissected plateau south from the southern watershed seems to slope very gently east-north-east. Northwest of Pinware Bay, at the western end of the Straits of Belle Isle, the surface scarcely reaches much more than 1000 feet above sea level, if as much. For this reason the river valleys

here are not generally so deep and narrow, and only exceptionally have they as steep walls as those just mentioned. The canyon-type, 100—250 feet deep, is however to be found in the Natashquan River (109) and the Augustine River valleys (107, 108, 950), but the valleys of the Pinware River and the Chateau Bay River have sides that are rather flattened; Fig. 12. The rather short and narrow valley, with vertical sides, drained by a small stream emptying into Black Bay (914) must also be mentioned here; it is clearly not very old geologically, otherwise its banks would have been flattened out. I therefore think that this and those mentioned earlier can scarcely be older than Pliocene. The crushing zones which have evidently predetermined the localization of such steep-walled valleys may have originated or been renewed concomitantly with the uplift. Belle Isle may have come into existence at the same time, and perhaps also the feeders opened through which the basalt at Chateau Bay burst out (cf. p. 118 sq.). However, as there are no Tertiary sediments here at all, it is not possible to determine exactly the chronological position of these various morphogenetic processes.

Valleys of the Atlantic coast.

In the southern part of the Atlantic coast, from Cape Charles to Cape North, the shore is rather low and the peneplain lies some 150—250 m above sea level. So far as the writer knows, no real canyon-valleys, comparable with those described above, have been found here; yet, at least some of the rivers, as for instance the Alexis and the Gilbert, flow in distinct valleys. Most of the valleys forming a continuation into the land of the bays in the southern part of the peninsula have a shape which somewhat reminds one of the uppermost section of the canyon-valleys, where they flare out on the plateau, Fig. 71.

More pronounced and steeper are the walls of the valleys in which e.g. the Paradise River and the Kipekak River flow; yet, on the northern part of the Atlantic seaboard there are many river valleys deeply cut by headward erosion in an approximately equal state of maturity. Meanwhile, these valleys are much shorter, partly because they are so near the watershed and partly because the water discharge is less.

Not until we reach the Nain district do we again find canyon-valleys of the same vigorous type as the Saguenay and the neighbouring streams. This is a surprising fact because all the rivers here are rather small. Toward the north of Hamilton Inlet the precipitation area on the Atlantic slope is narrow and the fiords penetrate deep into the country, cutting it up into many very small drainage systems which have no very considerable tributaries. However, the grade is steep and the erosion power evidently great. Instances of such rivers are:

The Assiwaban River is an example of a stream dropping down from the fairly level plateau described above at 350—400 meters above sea level in a

straight canyon-valley (119) some 120 km long and 200—300 m deep, ending at the tide limit in a fall of 23 m. The lower part of this valley has been widened out by glacial erosion, and in such an expanse the Cabot Lake, Fig. 72, has been dammed.

The Fraser River similarly flows in a narrow canyon-valley, somewhat modified by inland-ice erosion and having steep walls incised 300—350 m deep into the rolling peneplain, here reaching nearly 500 m above sea level; Figs 21 and 22. The walls at the valley head are so steep that the Eskimo hunting expeditions, on reaching the plateau, have at one place to haul their sledges up the rocks with ropes (761). When camping in these small, deep valleys, one is often awakened by masses of rock coming thundering down the sides, and the camp must be carefully pitched on an open space in the middle of the valley floor. The upper end of the Fraser River valley is a defile, called Bear Valley, and it rises 1500 feet in a distance of three miles up to the treeless plateau described by PRICHARD. The contour of the plateau is only broken by the deep rift through which the Fraser River flows; Fig. 22.

All these straight canyon-valleys are drowned at their mouths, some of them for 50 miles or more from the outlet; Fig. 20 c and 73. As a matter of fact they are all rift valleys in respect of their first outlining.

These last two river valleys have obviously arisen from the headward erosion following straight fracture or crushing-zones, so characteristic of the Nain archipelago (cf WHEELER's maps). Here it is moreover evident that every river valley developing along a zone of weakness has had a decided advantage over competing drainage that had to wear a valley in the compact rock ground, and this explains the great number of parallel valleys here. Both valleys show all kinds of glaciation marks, and are thus pre-Glacial formations. The steepness of the valley sides, even after the changes due to glacial erosion, and the fact that the valleys have not lengthened out very far back towards the divide on the plateau where they end abruptly with a very steep grade, lead to the conclusion that these valleys must be very young and scarcely older then the Pliocene.

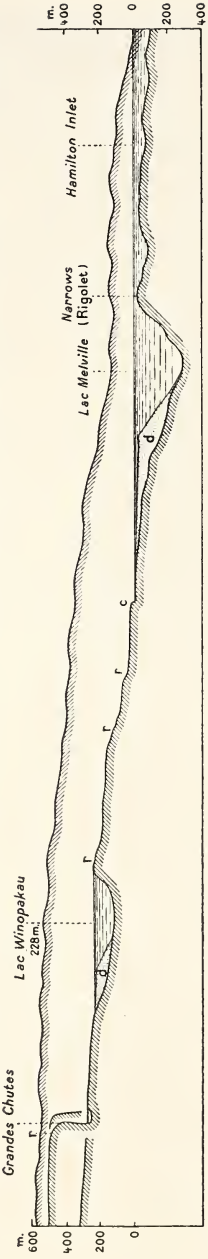


Fig. 74. The lengthwise profile ofthe Hamilton River valley drawn from LOW's maps by HENRI BAULIG. The horizontal scale is 1 : 5,000,000. Grand Chutes = Grand Falls. Abbreviations; c = Muskrat Falls, r = greater rapids, d = recent inner deltas (Cf. 48).

In the Torngak Mts several valleys up to about 3000 feet deep are to be found, transversing the ranges. The deep valley, for instance, which continues the Nachvak fiord from Tessynyak extends with but little abated strength across the Torngak Mts to the flat country on the west. The total length of this valley is about forty-five miles; rather more than half its floor lies beneath the sea (200). The valleys are cut so deep that many lakes in the heart of a high mountain prove to be only a few hundred feet above sea level; cf. Fig. 25 and 72. We shall return to these valleys later.

The Valleys of the large rivers rising in the centre of the peninsula.

Near Rigolet, about 50 miles from the Ocean, the innermost funnel-shaped bay of the Hamilton Inlet is reduced to about two miles in width and branches out into two magnificent salt-water lakes: Double Mer, some 70 km long and up to 4 km wide, and — after having passed the strong tide-water current in the Narrows — Lake Melville (434), some 170 km long and 15 to 28 km wide. Lake Melville is a tidal lake (523, 524, 1112), and into the large basin is collected the drainage from two great water-courses, Hamilton and Naskaupee Rivers, as well as a number of smaller rivers and brooks before discharging into the sea.

The valley of Hamilton River or Grand River is the principal and most interesting of the streams emptying into the Atlantic. Unfortunately the writer cannot here give the more detailed description of it which would be desirable, as I have only seen some parts of it and principally from the airplane. There are however already quite a few descriptions of it (cf. 105, 138, 139, 588, 594, 56, 287, 290, 98, 448, 837, 1000, 523, 644, 1093, 1113, 90, 290, 29, 610, 611, 935, 1112), cf. especially Low's report.

The headwaters of the Hamilton River rise on the tableland near the Canadian border, 1660—1900 feet above sea level. Afte several branches have joined in the Hamilton River, this winds away quite unobstructed by falls or rapids (cf. p. 218) mainly in an easterly direction towards the Grand Falls. Above the falls the altitude of the lake plateau is some 1550 feet above sea level. At the Falls, some 250 miles from the river's mouth, lies a natural divide where the river changes its character completely. Here it suddenly drops quite perpendicularly into the Bowdoin Canyon, finding there a deep pre-Glacial valley now tributary to the pre-Glacial Hamilton River valley, in which it again continues all the way to Lake Melville, with an average fall of 3.14 feet per mile (173). For the first 190 miles below the grand leap the valley is

Fig. 75. Looking from the south over Grand Falls in the Hamilton River. The drop is 101 (104) m, the foaming water mass below the fall swells up some 30 m. If one includes the cataracts above and below the steep fall the total height of Grand Falls is 253 m. Aerophoto the author, 3 Aug. 1937. Cf. p. 219 sq.



Fig. 75.

distinctly canyon-like, varying in width from half a mile to two miles, with high, steep, in some places vertical, walls. At Gull Island Lake it changes its character, broadening out rather quickly to four miles and assuming a more mature appearance. Then it widens gradually to five or six miles in its 60-mile course to its modern delta at the head of Lake Melville. Near its outlet the Hamilton River is a mighty stream, almost a mile and a half broad, and in the last 25 miles of its course, the breadth varies from a quarter of a mile to one eighth of a mile (434). Cf. Figs 74—78.

Lake Melville is between Neweisik Island and Trout Point restricted to only 2.5 km in width but is 74 fathoms [135 m] (probably even more than 100 fathoms)



Fig. 76. The Bowdoin Canyon above its junction with the Hamilton River valley. Aerophoto the author, Aug. 6th 1937.

deep. The greatest depths appear to be near the south-south-eastern shore. Its maximum depth is 160 fathoms [293 m] and its easterly branch, the Backway, has a maximum depth of 80 fathoms (146 m) (173). Lake Melville now communicates with Hamilton Inlet through The Narrows, a strait about 16 miles long and 1.5—2 miles wide. It is, however, obvious that before glaciation the valley ran straight on, some eight miles south of the present outlet, through the Backway, some 25 miles long and 4—2 miles wide, and reached the ocean near the present West Bay. At the end of the Ice Age however, this communication was cut off by the deposition of a dam of morainic drift later overlaid by a fluvioglacial delta, and the modern outlet came into existence. The lower part of the Hamilton was thus once, before the rise of the ocean level (of which further particulars will be given later), very much like the Double Mer in our days.

Two salient features in the lengthwise profile of the Hamilton River valley are: the bottom of Lake Melville reaching nearly 1000 feet below the present sea level, and the deep basin of the river valley occupied by Lake Winnikapau which is 427 (588) or 407 (105) feet deep; cf. Fig. 74.

These circumstances reveal the fact that the present form of the Hamilton valley cannot have been acquired by the erosion of the river exclusively. Naturally the remarkably deep basins in the river bed are to some extent due to the accumulation of drift near their downward ends. Meanwhile, the fundamental cause of this irregular overdeepening and widening must be attributed to the grinding and scouring effect of the inland-ice on the bottom of the pre-Glacial valley. This being so, it must be supposed that the present crosswise profile of the valley has been laterally widened to some extent; the form was evidently narrower, more canyon-like before the glaciation set in. Furthermore, the mostly continual expansion of the river valley below Gull Island Lake is evidently to a considerable extent due to the deposition of moraine gravel and river sediments on the bottom of the pre-Glacial valley, which the river is nowadays redepositing in the form of a delta built up at its mouth in Lake Melville; cf. Fig. 74. Such a delta has been deposited also at the head of the Winnikapau Lake, the upper end of which has been partly filled in, as shown by the figure mentioned above; here the walls are however so steep that the valley floor has not been much widened by the deposition of the delta material. Valley-trains are also found in many places, for instance downward from the Cache River for some distance. When these post-Tertiary alterations of the primordial valley are considered, it must be inferred that the river had developed a huge and perhaps graded canyon before glaciation set in.

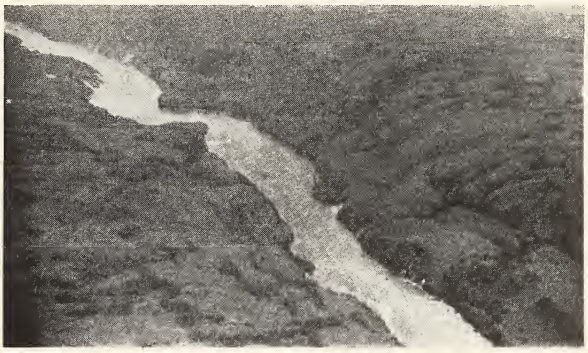


Fig. 77. Looking down over the Hamilton River below the mouth of the Cache River. All the hills are burnt, remains of forest growth only in the dells. Aerophoto the author, Aug. 1937.

Just south-east from Grand Falls the river flows 760 feet below the surface of the surrounding tableland, of which the height increases eastward from Grand Falls to some 2000 feet above sea level. Six miles above the mouth of the Metchin, the walls on both sides exceed 800 feet in height, and those on the west side rise perpendicularly direct from the river. At the outlet of Lake Winnikapau the rocky precipices tower above it 1000 feet or more. In the neighbourhood of the Cache River the valley is very regular, slightly serpentinizing, and the bottom lies 800—1000 feet below the rolling plateau. Above Minipi River the walls

rise from 700 to 900 feet above the river; here the valley is rather wide, 1—2 miles across. But, what is surprising is that downwards from Minipi the valley is restricted to a width of one-quarter to half-a-mile, and walled in by almost perpendicular walls rising abruptly from the water to more than 800 feet. In the neighbourhood of Gull Island Lake the hills vary in height from 500—600 feet above the river. At Gull Island the valley widens, the hills remaining about 4 miles apart. In the surroundings of the Muskrat Falls the hills on both sides rise 400—600 feet above the river level, but the general height of the plateau rises somewhat back from the valley on both sides.

These few figures will give some impression of the grandiose character of the rather mature Hamilton River valley.

At its western extremity, Lake Melville again contracts at North West River to a current and a small pond less than 20 feet deep; then follows a rapid estimated to be about 1.5 m high, above which it forms another narrow lake, Grand Lake, about 40 miles long, where a depth of 140 fath. has been sounded. The interruption between these lakes is formed by a marginal moraine-ridge, and we may suppose that before the Ice Age the water-sheet stretched without interruption 330 km from the ocean at Indian Harbour up to the pond into which the Beaver River and the Susan River debouch, and probably some 20 km more in these river valleys. It has thus been a fiord of which the length is comparable with the longest in Norway.



Fig. 78. Looking up the Hamilton River from above the northern end of Mud Lake. Aerophoto by the author, July 8th 1939.

The Naskaupee River debouches from the north into Grand Lake; it is the second great Atlantic stream. At the lower end its valley is broad and mature; but from six miles it narrows to one mile at a distance of 18—20 miles from Grand Lake. Along this distance there are no rapids (523). This indicates that the river here flows over its own delta deposits and valley-trains, a fact which can be confirmed fairly well from the aeroplane, flying along the lake. After that, the valley contracts; at the mouth of the Red River it is about 1050 feet below the normal plateau surface (994). It then rises with a fairly uniform grade to Seal Lake which seems to lie on or but little below the normal plateau surface. This short, mature, rather rapidly flaring valley, may very well have been developed by normal headward erosion in pre-Glacial time, so that it seems unnecessary to infer another method of formation (173).

Amongst the great north-flowing streams, the Koksoak or Kaniapiskau River is one of the most prominent and expressive. Low gives a description of it (588). In the approaches of Lake Kaniapiskau the river flows on flat land with occasional ridges. From the lake to the head of the first gorge the river wanders away at the level of the country, spreading out into lakes where the surface is flat, and contracting into rapids where it passes between low ridges. At the first gorge the river drops down from the general level into a deep, distinct river valley with steep, rocky walls, 500—800 feet high. This section of the valley is probably of ancient origin. Scarped banks and terraces resting on the rocky sides show that it became filled at least partly with moraine gravel during the Glacial period. Below this gorge the stream is rapid and graded for about 75 miles down to a second gorge, in which distance the valley widens and is cut 600—800 feet deep into the surface of the general plateau. At the second gorge the average slope of the country suddenly changes and breaks downward to the north-east. The river rushes violently over this slope through several narrow gorges — e. g. Eaton Canyon —, walled in by vertical granite precipices, in one of which the river drops 350 feet in one mile. This section terminates at Granite Fall, 80 feet high, over which the stream drops into a still deeper valley, less than one mile wide, with rocky walls that in places rise sheer to 800 or 1000 feet. After that follows a comparatively quiet stretch, some 40 miles long, the greater part of which is a long, narrow lake, Cambrian lake; at this place the hills rise 800—1500 feet above the surface of the lake, which is about 400 feet above sea level. Down stream follow Shale Falls, 60 feet high. Below this point the river is again well graded, until it drops over hard beds forming a series of great rapids and falls. Below its junction with the Larch River, the Koksoak River turns to the north-east and cuts a mature valley 500—600 feet deep across the 'Labrador Range' (p. 110). Some sections of the valley are here narrow and distinguished by steep walls, and they still form canyons, whereas others are widened out and occupied by lakes that drain one into another by means of relatively insignificant streams.

The Larch River or Stillwater River, a tributary of the Koksoak River, forms an almost continuous shallow rapid from its headwaters to the junction. Above the Natuakami Lake the stream flows 700 feet deep below the general level of the surrounding region; below this lake the depth of the valley increases so that at the junction with the Kenogamistuk it is about 1000 feet below the level of the peneplain. Below the junction the valley is 2—4 miles wide, again with a fairly well-graded bottom, and the surrounding country gradually decreases in height as Ungava Bay is approached (589, 173).

Like the Koksoak, the George River, the main river of the north-eastern part of the peninsula, rises in a chain of lakes north of Mishikamau Lake and flows northward to Ungava Bay (460, 461, 995, 758, 761, 173). As far as can be gathered from scanty references, the valley is rather open, broad, sub-mature and cut on the average 800—900 feet into the rolling plateau surface. It has large sections well graded, though rapid. The uppermost part is a succession of lake expansions of varying size, the water dropping from one to the other down

shallow rapids. I flew in over this part of the river and it gave more the impression of wandering, capriciously winding over a glacially eroded plateau than of a true valley landscape. However, ten miles below Resolution Lake, the river is reported to fall through rocky gorges in a distinct valley. Some distance below, the hill on the east side rises 630 feet high, and down stream higher hills steadily follow. The river then enters the head of Indian House Lake through 'what was like a magnificent corridor'. On the east of this lake the hills in some places rise abruptly from the water [some 700—900 feet high], whereas on the west they stand back a little with [fluvio-glacial] sandhills and terraces between. Below the lake the current becomes swift, and in long stretches the gradient of the river bed is rather steep; slack waters are few and short. Below Helen Falls the mountains spread in a wider sweep to the sea and the river gradually increases in width. Wallace speaks of a sort of canyon.

Flaherty reports (265) that the white-veiled torrential Pain River plunges sparkling out into Ungava Bay in a canyon between belts of flowering plants.

The Valleys of the streams emptying into Hudson Bay.

Only a few of the streams emptying into Hudson Bay are better known (591a, 589, 56, 173). For the most part they follow fortuitous, post-Glacial courses when flowing on the tableland, but at least some of them drop abruptly in what are obviously pre-Glacial, rather narrow canyon valleys incised some hundreds of feet into the surface.

Some Conclusions drawn from the Behaviour of the Valleys.

Even the principal valleys have been found filled with glacial deposits, and the streams have not yet had time to remove the drift completely from the bottom, much less to renew the erosion of the valley bottom during the post-Glacial period. It is therefore clear to the writer that the valley-cutting was quite complete before the last Glacial epoch began. In many places too it has been found that the valley antedates the present stream, as is shown for example at Grand Falls (p. 219 sq.) in the Hamilton River, where the present river falls into the deep valley from the side (588, 594, 105, 914), and above this point the old valley continues its earlier direction upwards. In conclusion, it must also be said that the deep Labrador valleys could not have been initiated and developed in the rather short inter-Glacial epochs. It seems thus incontestable that at least the greater part of their development was accomplished in pre-Glacial times (173). It must, however, be remembered that the valleys were in some places considerably enlarged by glacial over-deepening.

The valleys thus antedate the present streams. At the supposed dome-like uplift of the peninsula, the erosive power of the rivers increased and the radial

stream pattern was incised successively deeper. Yet it appears improbable that, for instance, the Hamilton River valley was cut out merely by simple headward erosion. In that case, above Lake Melville, the walls in the lower sections of the valley must have been flattened out and the whole valley much widened.

The intrenched serpentines, even if only slightly curving, as for instance in the Cache River district, Fig. 77, and in the lower part of the Bowdoin Canyon, Fig. 76, gave the writer the impression, while flying over them, that the river course and the river bends might have been founded by superposition before the peneplain was warped up. It is possible, I think, that the serpentines are inherited from an old stream and that they originated when a consequent, slightly curving stream carved out its valley in a homogeneous material, e.g. in a cover of Keweenawan sandstone, and by downward-cutting the bends soon became incised in the subjacent, rather heterogeneous Archaean rocks. When the stream was rejuvenated by the uplift of the area the serpentines became still deeper intrenched. In these no noticeable subsequent changes of form and trend by differential erosion seem to have occurred; where the stream had established its course before the uplift, it maintained it by downward cutting as fast as the uplift continued. The canyon-like shape of the valley and the comparatively small change in width throughout its length of 250 miles is strong evidence (173) of its having been formed rapidly, rather than by the infinitely slower process of headward erosion.

It might be thought that the origin of that section of the valley in which the Hamilton River, coming from lower land in the west (1550 feet above sea level), transverses the higher land in the east (2000 feet above sea level), and which thus represents a kind of water-gap, could be explained by the above theoretical consideration. Yet such a hypothesis seems of itself not exhaustive. To give for instance the region transversed by the Hamilton River a general eastward slope of only one foot per mile would require, as COOKE has already remarked, a thickness of more than 700 feet of sedimentary rocks at the headwaters. Sparse remnants of a sandstone cover have been found in the Lake Plateau area. It seems, however, to the writer most doubtful that the degradation during the relatively short Pliocene time could have worn away such a mighty covering of sediments as that calculated to so great an extent that only some rather modest 'witnesses' have remained scattered here and there.

For this reason some geological action other than weathering and river erosion must have participated in the formation of the river valleys of Labrador. The most probable is displacement by faulting.

If we glance at the Hamilton River Valley in the neighbourhood of the Minipi River mouth we shall find that the river makes not only an abrupt bend from an east-south-easterly direction above the mouth to a northerly one below it, but that, at the same time, the valley here narrows from one to two miles across above Minipi to a quarter to half-a-mile wide below it with mostly perpendicular rocky walls, that rise abruptly from the water more than 800 feet; here the river forms an almost continuous rapid. This bend, which in greater than a right angle and constricts to a rocky gorge, where the erosion has thus been to some extent rejuvenated, can scarcely be explained without the assumption that here a large lithosphere block has been somewhat displaced by thrusting or up-warping.

Cooke has mentioned another similar anomaly: the pronounced difference in the width of the valley above and below Gull Island Lake. This, he thinks, may be due to the localization of the stream below this point on the Lake Melville down-faulted block (cf. p. 113). If this section of the stream had been left on a down-faulted area when the remainder of the plateau was elevated, subsequent erosion would have been mainly lateral instead of downward, and the more mature appearance of the lower valley would thus be readily understood.

Consequently, the fracturing and the displacement by faulting and overthrusting, younger than the first beginning of valley-carving, must have influenced the valley formation. Unfortunately we know as yet very little about these conditions and it is almost impossible to evaluate the degree of their influence.

The principal valleys seemto be in roughly the same stage of development: narrow canyons with many rapids alternating with large, graded valley stretches (cf. 173). Though differences occur in detail these have originated partly by means of local differential warping or tilting of lithosphere blocks which the streams had to saw through in canyons, but they are partly also due to the glacial action: deposition of drift and glacial erosion. Most of the greater widenings in the valleys, of which some are occupied by long, narrow lakes, — e.g. the Cambrian Lake in Koksoak River, Indian House Lake in George River, Cabot Lake in Assiwaban River and Winnikapau Lake in the Hamilton River — are all due to the glacial action in the pre-Glacial valleys. Cf. Figs 72, 74.

An upper chronological limit of the valley formation has already been mentioned; the lower limit is more difficult to fix because of the lack of Tertiary sediments. The generally rather young shape of these valleys indicates that they cannot have existed very long before the Quaternary period. If

the contrary is assumed, the valleys' sides ought to be flattened out and the profiles graded. But, on the contrary, we find that, where the streams have cut through the presumably up-warped blocks of the plateau, the valleys are of a youthful type with rapids and falls in the smaller streams, but graded bottoms in the larger, so that their age might be termed late youth. On the other hand the lower sections and the mouths of nearly all the valleys might almost be termed mature, especially in places where the plateau was not much uplifted, presumably owing to the fact that the downward erosion was less pronounced than the lateral erosion.

From these facts COOKE already concluded that the valleys must have been initiated in the latter part of the Pliocene period. This is precisely the same conclusion as the writer's due to the same reasoning for the corresponding river valleys in the north and north-eastern parts of Fennoscandia (Soc. Sci. Fennica, Bidrag, Part 86, 1938) and I therefore completely agree with COOKE's opinion.

Nevertheless there still seems to be some dissimilarity between these areas. From the rock terraces on the valley sides different stages in the development of the valleys can be easily discerned in the western parts of Fennoscandia. Of these, two generations especially stand out: one with senile, flattened-out valleys, in the bottom of which the second, younger has been fixed in the form of canyon-valleys. This shows that the increase of the relief-energy has proceeded by two main stages. In Labrador in general no conclusive proofs of two principal erosion cycles are yet known. Indeed at some places in the valleys near the Atlantic seaboard, one can distinguish comparatively level areas on the flanks, possibly remainders of river terraces incised into the rocky sides, for instances in the valleys which open from the north side into the Manvers Run. Moreover, from the valleys in which Mary's River, Alexis River, Gilbert River, Paradise River and Eagle River flow, the writer had the impression that two stages might be distinguished in their rise: an older cycle which had already attained the stage of advanced senility and whose valley sides had been almost worn away before the renewed erosion initiated a younger cycle, marked by distinct V-shaped valleys which have reached early maturity (914). Meanwhile, this circumstance needs strong confirmation by systematic morphographical analysis before it can be accepted as a physiographic fact throughout.

A detailed ocular study of the surface forms, drainage, etc. is however extremely difficult and uncertain in the wooded parts of Labrador where the forests are so thick that the outlook is very restricted. This and the absence of reliable maps compel us to let the matter rest here.

The uplift of Labrador in Pliocene time.

Taking all these facts together the conclusion seems already unavoidable that Labrador's big river valleys were initiated in late-Tertiary time, perhaps in the Pliocene, and deepened by a rather ubiquitous, sudden and strong increase of the 'relief energy', namely the grade, in all the water courses of the peninsula. Without this assumption the present forms of the river valleys would be inexplicable. Such a regional increase of the erosion power can be thought to have arisen either by an elevation of the earth's crust or by a lowering of the base level, viz. the sea level, or perhaps, as seems more probable, by the joint action of these two phenomena. After that erosion was at work so long in pre-Glacial time that the streams became fairly uniformly graded. Later their profiles have been locally disturbed by tectonic displacements and the action of the inland-ice.

It may be asked what is the rate of the up-throw of the peneplain in the centre of the peninsula, and what is the vertical rate of the sinking of the sea level?

Taking into consideration the circumstance that the rivers were most probably nearly at grade before the glaciations set in, the amount of uplift must have been somewhat greater than that indicated by the maximal depth of the river valleys in the centre of the peninsula. But it must also be remembered that some, if not all, of the river valleys continue out over the continental shelf. I do not know any exact figures of the depth of these 'drowned valleys', and it may be argued that they have been overdeepened by the Quaternary valley-glaciers; yet there is indisputable proof of the submersion of the lower ends of the river systems, viz. the bottom of the Gulf of St. Lawrence which was not flooded by the sea until the Quaternary (cf. p. 226 sq.). Under these circumstances the figures for the uplift must be increased by some 200—250 feet and we get therefore a temporary minimum amount of approximately 1000—1300 feet for the total uplift of the peninsula in Pliocene.

But the upheaval cannot be so easily calculated as this. It must be considered that the tectonic action has, in a way not yet possible to check, altered the main traits of the Tertiary land surface (see later on). A definite solution of this problem is a matter for the future, but some outstanding characteristics will be pointed out in the next chapter.

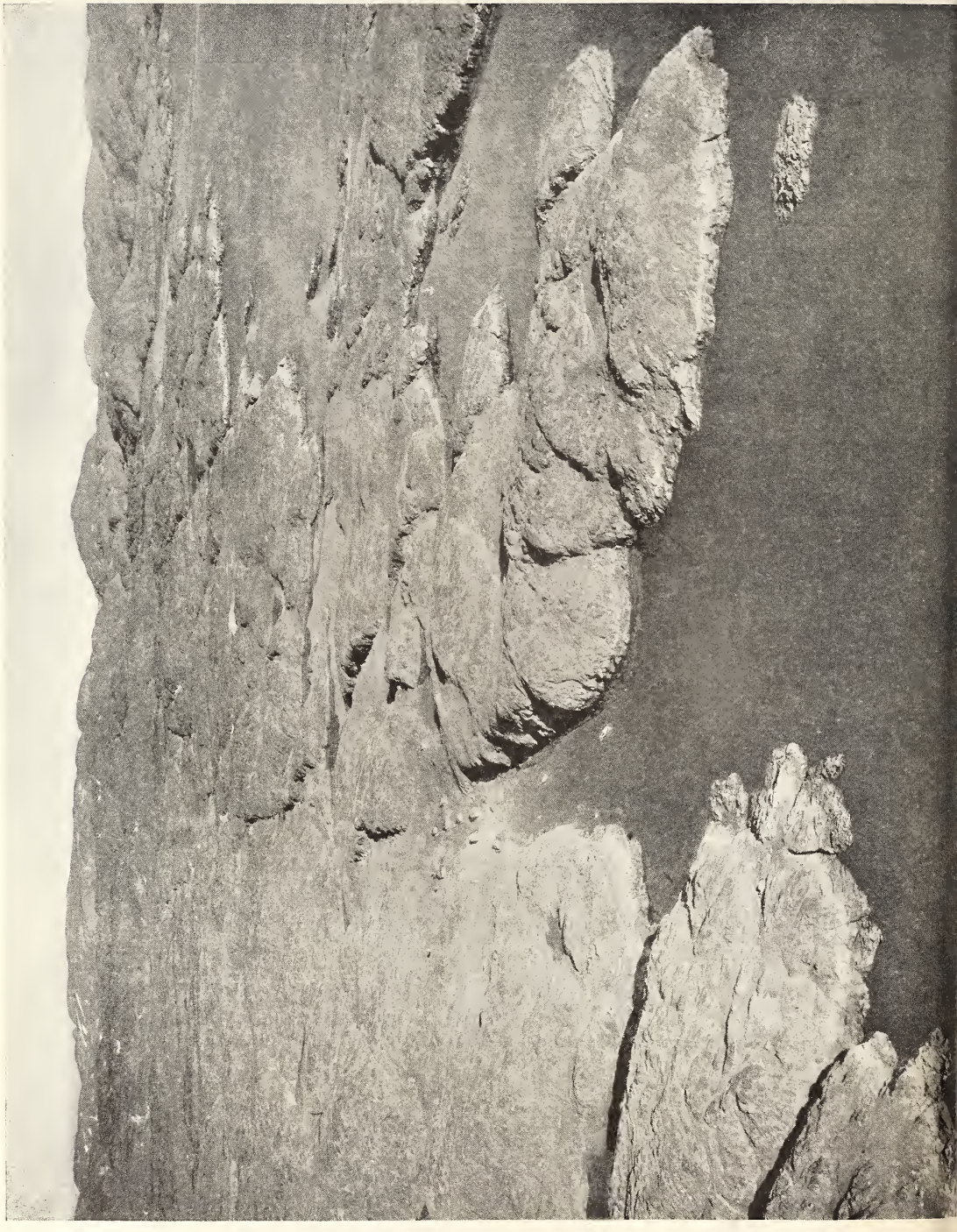
The deformation of the Pliocene relief features.

We have found the widespreading Palaeic peneplain after uplift undergoing dissection by the rejuvenated stream erosion. But uplift was accom-



Fig. 79. Looking west over the northernmost part of Killinek Island with Port Burwell, the Hudson's Bay Company's post, lying in the cove 55 mm from the lower and 32 mm from the left edge of the picture. The topography and drainage pattern is controlled by joint and fracture systems. Aerophoto FORBES-GRENFELL EXPEDITION, 1931.

panied by a release of tectonic movement both round the edges of the uplifted area and within it. At the end of the Tertiary, a rejuvenating of old rifts in the rock ground and perhaps new fracturing occurred, limited to faults, crush-



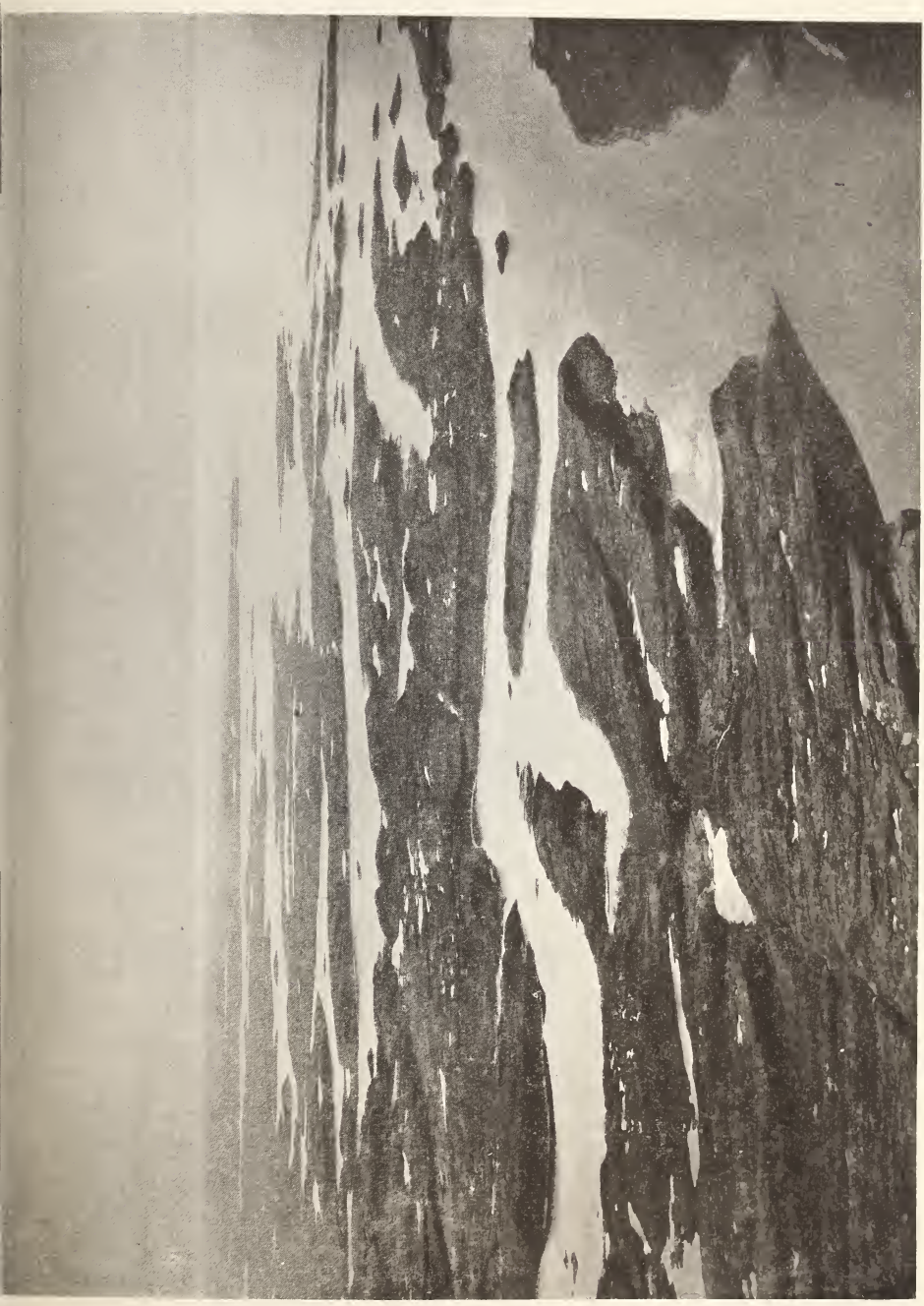


Fig. 81. Looking south-west along the complex indentations of the eastern coast of Ungava Bay (275).



Fig. 82. Looking east from over Ungava Bay. Tunnissugjuak, the north branch of Joksut Inlet, is seen penetrating the mountains above the centre of the picture. In the foreground the low land with its complex system of small lakes typical of the Ungava coastal region. In the background the mountainous land. On the horizon the Atlantic (275).

ing, and local bands of foliation. A glance at an adequate map, representing the distribution of land and water, for instance, in the Nain archipelago and its upland (e. g. CIX—CXII), throws much light on the subject. The rock ground here is almost completely homogeneous, consisting of anorthosite. On the map we find a jumble of straight valleys, many tens of miles long, of nearly uniform breadth and often with perpendicular walls, intersecting each other at almost regularly repeated angles. These valleys appertain to a few distinct systems with parallel valleys. The farther north, the larger are these rifts; see for example the gigantic chasms of the northern narrow fiords with quite perpendicular walls nearly 3000 feet high.

A similar strange topographic type of rock surface with cracks enlarged by weathering and glacial erosion and crossing each other, is to be found in the gneiss area at the northernmost section of the peninsula; Figs 79 and 80 (cf. IV and V). MacLelan Strait or Ikkerasak (Grenfell Tickle) is here an excellent example of a fracture valley; Fig. 32. It is a twenty-mile-long narrow channel, running from west-north-west to east-south-east, separating Killinek Island from the mainland. For a distance of 14 km its breadth only exceptionally exceeds one km, but in long stretches is only 0.3 km. In this channel arise powerful tidal streams which can reach 10 knots. The lattice-like topographic structure of strangled fault lines, with a prevailing north-westerly direction and crossed by a number of faults with other trends, here causes the elbow turns of the rivulets and the dividing up of the lakes and swamps and the striped collection of the mossy vegetation in the district.

It is a matter of course that in both these cases the localisation of the erosion has been predetermined by joints and rifts in the rock ground before the digging-out began which formed the valleys.

The uplifting which led to the slanting position of the Palaeic peneplain has clearly not been able to proceed without greater or smaller rifts in the rock ground. It was broken up into several big, connected blocks, separated from one another by cracks or faults or fault zones. Some of these partial blocks are very large. Owing to mechanical laws, the cracks and rifts in the main follow a few average directions; in the north-eastern part of the peninsula one of the most pronounced is parallel with the ocean coast, as for instance the central depression between the coastal range and the inner range of the Torngak Mts (p. 159). Other directions of the valleys are here towards the north-north-east and the east-north-east and the south-east. By the interference of these four principal directions some intermediary, rather curving trends came into existence; cf. Figs 32 and 81. Looking at the new hypsographic map of northern-

most Labrador of the scale 1:300,000, published by the American Geographical Society, one gets the impression that these partial blocks have been slightly moved relatively to each other both laterally and vertically; cf. Fig. 80.

By a faulting zone running along or near the meridian of 64° 45', the peninsula between Ungava Bay and the Atlantic north of 59° 45', is rather sharply divided into two different types of landscape: towards Ungava Bay is a flattened-out terrain which to a very great extent lies below 50 m, while towards the Atlantic is a mountainous land between 250 and 450 m above sea level; Fig. 82 (cf. map No. V). Within the former there are numerous small lakes, small islands, capes and bays, the main directions of which are north-west, north-to-west and west-north-west; Fig. 81. The wealth of small collections of standing water is so great here that they render travelling difficult. On the other hand, to the east, in the mountain country, large connected forms predominate, bounded by valleys in the directions north-east, north-south, and north-west; here there are only a few lakes but they are larger and presumably very deep, to judge by the huge waves driven up on them by a storm (cf. also p. 163).

Nevertheless, one must not interpret every straight, narrow valley as having originated in consequence of faulting and displacements. From the aeroplane one soon finds in Labrador that every bald rock surface is lined by numerous, still narrower trenches, stretching mainly parallel kilometer after kilometer at some hundreds of meters from each other. These are crossed at the same angles by other straight, narrow valley trenches, belonging to other systems, and in this way arises the special topography of crossed trenches, which is called f i s s u r e-v a l l e y t o p o g r a p h y, and which forms one of the most prominent features in the mountain surface's micro-topography both in Labrador and in Fennoscandia; Fig. 79. The fissure-valley topography appears in its greatest glory far away in the north, on the western side of the peninsula, between the Atlantic and Ungava Bay. According to HANTSCH, the higher parts of the mountains there are polished smooth by the land-ice, and not infrequently it is possible to walk a whole kilometer on a rock ground as level as a floor, of which the vegetation has also been swept away by the wind, mosses, grasses and plants marking the protected fissure-valleys. A survey of the fissure-tectonic made here is therefore the best possible. This type of lineament of the rocky surfaces has originated almost solely by the simple weathering out of the fissures and joints or the fracture cleavage bands and the posterior rubbing-up of the residual material from the trenches thus arising. Scarcely any noticeable displacement is to be found in these areas.

It can only in a few cases be proved that the straight valleys have been traced out by faulting or over-thrusting. This is due to the fact that the crushing zones and breccias in which they arose have been specially easily attacked by the erosive agencies, and were soon worn at the bottom, as a rule so completely that to-day no trace of breccia in them witnesses to the first impulse of the valley formation. However, in some places conclusive proofs are to be found that drainage has been localized at fault- or thrusting-zones. This is true of the basins of Double Mer and Lake Melville, at least the western sections of them. These lakes lie in fault-grabens, on down-faulted sandstone blocks, which crop out on their northern shores, but are down-warped towards their southern shores and there bounded by a fault-lined scarp above which e.g. the Mealy Mts rise very prominently.



Fig. 83. Looking from above 5 miles south from Cape Francis toward north-north-west over the broken coast land between the mouths of Lewis Sound and Alexis Bay. The strike of the gneiss determines the orographic lines. Aerophoto the author, 1939.

At the Atlantic coast block-faulting has influenced the topography in wide areas. In the Kaumajet Mts the east-north-east edges of the blocks have usually been somewhat tipped up, while the western edges of the adjacent eastern blocks have sunk, some of them even below the sea level. On the other hand, in the district round Kaumajet flexures have arisen which, when combined, give an impression of slight folding; Fig. 60. In the pictures of these areas, whole series of small fault scarps occur, with here and there inconsiderable flexures. The cuesta-like topography for instance in the Torngak Mts immediately north from Mt Razorback may have something in common with faulting; the glacierette erosion can scarcely have worked out the forms; cf. Fig. 84. The consequence of these movements has been that the surface of the blocks, which had previously been horizontal, now slopes slightly towards the west. A landscape in miniature, reminding one of the block-faulted land of east Asia, has thus arisen fronting the Ocean.

Another instance of this, but one which at first glance is less convincing, is given by the trend of the coast. This has a strike from north to south between Battle Harbour and Domino Run, and is remarkably straight and



Fig. 84. Looking north over Mt Razorback. The head of Razorback Har
Sapogatsiek Bay; bey



he extreme right. Next beyond, across the centre of the picture, is slands Bay (275).

in parts free from skerries; cf Figs 40, 42 and 314. Here the coast cuts clean across the strike of the gneiss and therefore appears as a faulted coast which here and there is marked by sheer cliffs, rising to more than one hundred meters above sea level, as at Cape Bluff and at Cape St. Michael and at Kiglapait. The numerous small fiords on this transversal coast are drowned strike-valleys (536 b), e.g. Fig. 83.

In contrast to this the Atlantic shore between Domino Run and Hamilton Inlet is a typical longitudinal coast, the trend of which coincides with the strike of the gneisses. The shore is low and skirted by some islands,



Fig. 85. Looking south-east from Holton over the skerries. Photo the author, July 1937.

and the low, hummocky surface rises slowly landwards in long, bulging waves. Cf. Fig. 38 c and 85.

It might be doubted whether, at Lake Melville, any real displacement has occurred if the down-warped sandstone did not prove this fact. In places where the rock is the same on both sides of a straight valley trend, it can be most difficult to prove whether one is dealing with an ordinary erosion valley or with a valley worn out in a fault- or thrust-zone, unless one finds remains of rift-breccias or schistose foliation bands in the rock. However, in some few places one can prove the existence of mylonitized rupture-zones, making it clear that at least some of the valleys in a local system of strictly parallel valleys have been pre-determinately localized by tectonic phenomena and the subsequent weathering and erosion of their traces. In this case it seems admissible to attribute the predetermination of all the valleys of this system to the same cause. An illustrative instance of this kind is the straight valley crossing the Double Mer and Lake Melville's scarps, from the eastern foot of Pompus Head Mt. in the direction E 30° S

over Moliak into Backway; this long rupture is accompanied by a broad band of mylonite or thinly foliated sericitic schist, products due to the shearing along the rift-zone. The Mulligan and the Grand Lake valleys run in the same direction.

The deep dissection of the fault scarps south of Lake Melville by comparatively small streams of about uniform grade appears to mark the faulting as belonging to the general uplift. This is what may be expected (173). The writer thinks, however, that here, as in Fennoscandia, the majority of the faults and thrust-zones existed prior to uplift. Most of them originated perhaps already in early Archaean times and have since been repeatedly renewed. On the other hand, the faulting has undoubtedly continued even since the uplift in Pliocene and it will continue. Both the Atlantic coast (434) and the Gulf coast (OGILVIE 1926) are still seismic districts. Even in the interior, near the Canadian border, north-west from Lake Petitsikapau the writer discovered from the aeroplane a recent fault of which the western side had been thrown up a few metres and which was as straight as if traced with a ruler, continuing northward as far as the eye could see.

As has already been suggested, the peninsula was hardly uplifted as a connected, rigid slab of rock but as a mosaic of large blocks. In consequence of slight displacements occurring within the block-aggregate and perhaps block-faultings, the presumably primordial evenness of the palaeic peneplain became more or less distorted and unequally deformed. By the same process the peninsula diminished considerably towards the ocean (cf. p. 160 sq.).

The deformation of the old peneplain is most conspicuous in the northern section of the Atlantic seaboard where the up-warping has reached its maximum. Here different mountain groups occur which superior elevation and peculiar morphography mark out as topographic individuals. As has already been stated the morphological shape of the coast land north of 56° 30′ lat. is quite different from the forms of the peneplain southward.

With the K i g l a p a i t M t s at 57° 10' lat. N. the coastal mountains begin to rise with steep sides and jagged crests directly out of the sea. Kiglapait, Fig. 42, has its name from the very ragged sky-line and means in Eskimo *Dog Teeth Mountains*. The serrated range with its ten individual summits is not more than thirty miles in length and reaches approximately 900 to 1000 m above sea level.

The K a u m a j e t M t s at 57° 45' lat. N. (cf. p. 100) means in the Eskimo language the *'Shining Mountains'*, and this name suit them exactly, because

the brilliancy of the crests is grand especially when covered with a fresh fall of snow (200, 275).

The T o r n g a k M t s, following the Eskimo denomination which means '[*the home of*] *the bad spirit*' (CXIV), has also been called the N a c h v a k M t s (892) or N a c h w a k M t s (530). DALY proposed that the ancient Eskimo name should be extended to include the whole belt from Hebron to Cape Chidley with its wild ragged alpine nature. However, this name seems to be restricted to the mountain area which springs directly out of the sea from 58° 30′ to 59° 40′ lat. N. The Torngak Mts contain the highest and most spectacular summits of the Atlantic seaboard of the American continents.

The evidence of the Torngak Mts.

The most interesting of these dissected block-mountains are the Torngak Mts. They rise steeply direct out from the ocean in the east, while west of them extends an undulating lowland. The asymmetric topography of the country leads one to think that it was raised in the east and sunk in the west. At about 59° 15′ lat. N. the eastern border of the palaeic surface became warped up some 1200 m (referred to the present sea level) but this height decreases both northward and southward as well as toward the west. Unfortunately, the bathymetric conditions of this part of the coast are not sufficiently well known (cf. the British chart No. 1422, corr. June 1933, and Fig. 129), so that it is possible only to estimate the total upthrow of the block-mountain over the continental shelf. It seems likely that the reefs and small groups of islets off the coast are formed by the residual relief of the adjacent blocks of the earth's crust which remained at a relatively low level during the displacement of the western blocks. In the same way the drowned blocks stretching parallel with the coast may have originated.

In 1753 Captain SWAINE seems also to have noticed submerged blocks. He reported an important fishing bank about six leagues [29 km] off the coast, extending from lat. 54° to lat. 57°. In 1860, H.M.S. *Bulldog* proved the existence of a bank extending north and south of Hamilton Inlet for 180 miles and at least 100 miles in an easterly direction. Sir J. C. ROSS reported that this bank stretches parallel to the coast for a considerable distance north and south of Okkak (325). After his explorations in 1875—76, HIND (435, cf. 325) called particular attention to the row of banks extending along the greater part of the Labrador coast, and prophesied that they would become the great fishing-ground of the future.

To some extent these banks may have been built up by morainic gravel deposited by the inland-ice. But the fundamental basement may be rock.

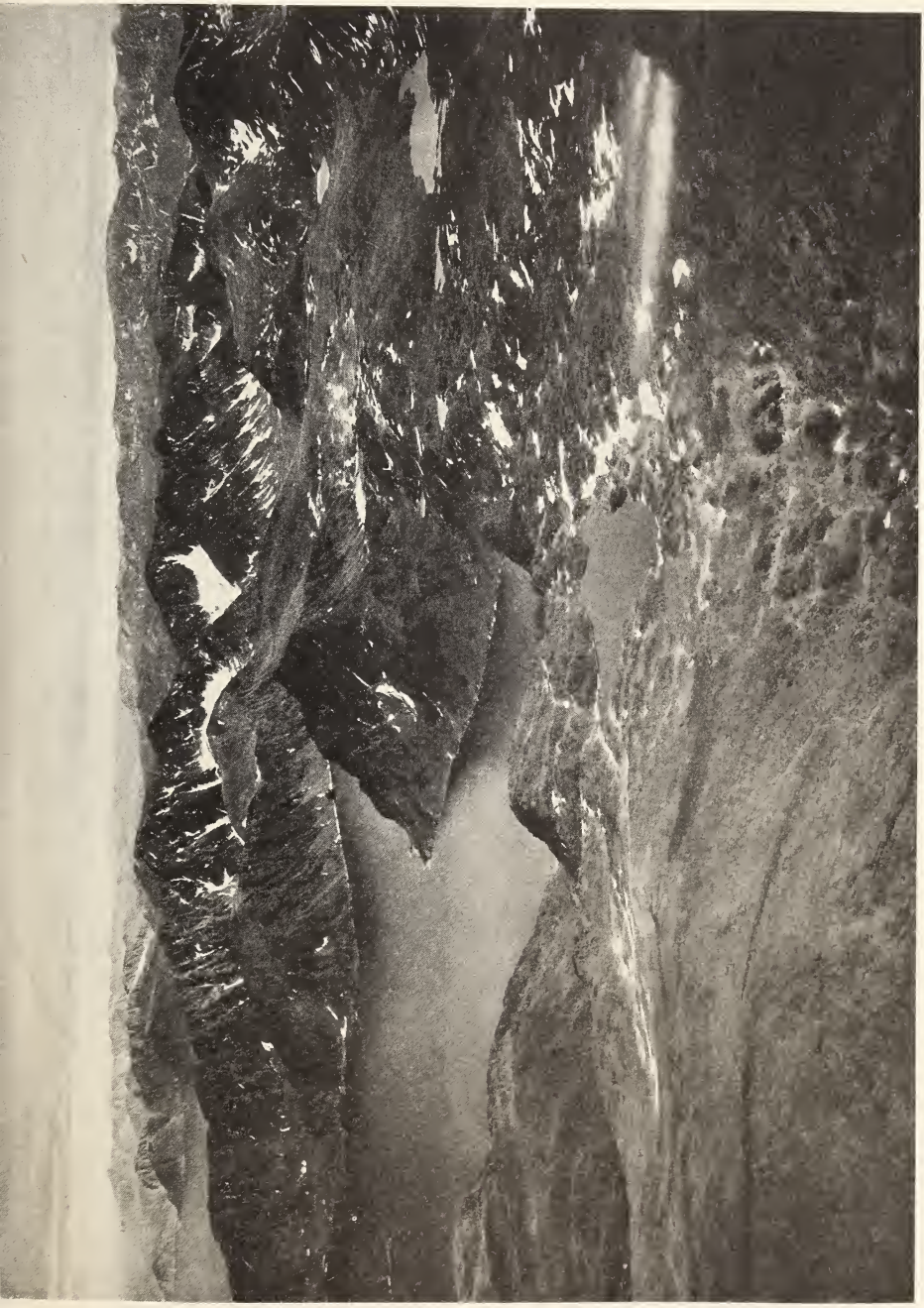


Fig. 86. Looking south over Mt Razorback and the mouth of Razorback Harbour (275).



Fig. 87. Seven Islands at the Torngak coast in the foreground, seen from the north-east. Nehungateluk in the centre and mouths of Kangalaksiorvik and Komaktorvik Fiords to right and left respectively. Arvegalik Island (Whale Island) in the foreground, Amiktok Island between this and Nehungateluk. The large mountain appearing above the mouth of Kangalaksiorvik Fiord is Tetragona Mt. Aug. 1931 (275).

The total difference in altitude between the up-warped Palaeic surface and the continental shelf thus amounts to perhaps some 1400—1500 m max. It is therefore scarcely possible not to assume that the eastern border is formed by a fault zone stretching in the main parallel with the coast.

The new map of the Torngak Mts group, worked out on the basis of observations made by the FORBES-GRENFELL EXPEDITION (V), shows that the bold mountain is composed of a series of separate ranges or alignments of clusters of peaks and summits. ODELL combined them into two ranges from a structural as well as a strictly topographical point of view: t h e c o a s t a l r a n g e, running along the seaboard for 40 miles north-north-westward from Saglek Bay and the i n n e r r a n g e with the loftiest summits (Innuit Mt. 1425 m, peaks between Chasm Lake and Upper Komaktorvik Lake 1505—1390 m, Precipice Mt 1330 m), running nearly parallel with the coastal range and extending across the inner end of Nachvak Fiord about 50 miles to the north-west; Figs 27 and 28. The mountains of the coastal range are somewhat lower (Razorback Mt 1117 m, Mt Ford 1115 m, Mt Faunce 1286 m, Mt Eliot 1291 m and 1388 m, Mt Tetragona 1040—1375 m, Four Peaks 1168—1346 m, the mountains between Aulatsivik Island and the uppermost part of the Eclipse River 1041—1080 m). But as they rise quite sheer out of the sea, their relative altitude is nearly as high as that of the inner range; Figs 86—88. In the coastal range mountains also diversity of form is conspicuous; at the southern end are more rounded summits, while deeper dissection appears further north, forming an irregular network of sharp peaks and narrow ridges, separating deeply carved cirques and trough valleys, in some places however intersecting in serrate ridges. But the most interesting and significant forms are the flat-topped summits with cliffs on all sides, e.g. Castle Mt (Fig. 93 in 275); (cf. p. 65 sqqq.).

The interior range is smaller than the one just described and is topographically more a branch, diverging from it south of Nachvak Fiord. It has no sharp peaks; its western slopes are gradual and extend in gentle undulations to the shore of Ungava Bay and near the George River. Between its northern end and the coastal range is a central basin 5—10 miles broad from which the interior range rises steeply. This c e n t r a l t r o u g h appears to be a zone of structural weakness, a fault feature or a series of faults, later carved out by the drainage erosive onslaught of water and atmosphere (694).

A very striking and important physiographical peculiarity in the Torngak Mts, as first pointed out by ODELL (692, 694), is that several of the Atlantic

rivers have their sources in the interior, westward of the mountains, so that the water divide is not at the crest of the principal range, but the rivers cut crosswise in veritable trenches partly occupied by lakes through the ranges to reach the head of the Atlantic fiords. The rivers run more or less parallel, forming an almost rectangular valley pattern, one direction nearly parallel to the main trend of foliation and cleavage of the rocks, north-north-west, the other at right angles to it, determined by cross joints or faults.

Such rivers flowing right across the mountain ranges as well as the peculiar erosional pattern we know well from the Scandinavian mountain range, the Kjölen. There marks of antecedent river valleys and piracy, due to retrograde erosion, are not unusual phenomena. The reason for this anomalous course of the rivers may be the same in Labrador as in Fennoscandia: powerful headward erosion in rejuvenated rivers pushed the water-divide in pre-Glacial time farther and farther towards the west until it had nearly reached its present position. After that, during the Ice Age, the currents in the inland-ice grounded and scoured the thresholds of the divide which in that way was shifted still further to the west. In the Torngak Mts these conditions are illustrated by the Eclipse River drainage system.

From a physiographical point of view the Atlantic coasts of Labrador and of the Scandinavian Peninsula are in the main reflected images of each other. Both are bounded towards the sea by extremely pronounced fiord coasts. The culmination axis of each country lies near the sea and is crossed by water courses having sources at a rather low level in towards the country. It may therefore be said that the Atlantic seaboards of Labrador and Fennoscandia show good homology morphologically. This condition justifies the question: to what extent has the homology arisen from the unfolding of the same sequence of geological processes in both countries. Has also in the coastal zone of Labrador an up-vaulting of the block mosaic been combined with a series of faults running in the main parallel with the coast? As a matter of fact the topographical conditions do not appear to answer, No! Cf. Fig. 90.

In consequence of what is known as yet about the morphology and geology of the Torngaks the writer thinks that the uplift in general developed in the same way in Labrador as at the Atlantic coast of Fennoscandia. A general upvaulting of the peninsula's Atlantic border must have occurred, accompanied by a down-throw of those eastern fault-blocks which are to-day totally or nearly submerged by the sea. The mountain must therefore consist of a series of steps with fault scarps towards the ocean; every step is a broad dissected plateau, a 'land staffel', or the tread of a step with a 'staffel rand'

or steep scarp on the seaward side. From the map it appears that many of these 'staffel rands' are slightly curved. Moreover, some displacements have also occurred in the block-mosaic concomitantly with the upvaulting — Fig. 90 — the blocks of the inner range having seemingly been more uplifted than those of the coastal range. The present topography of the slope (cf. p. 66) may therefore have arisen by the dissection of the faulted block-mosaic. This explains the morphological complexity of the mountain group.

No detailed observations in evidence of this supposed upvaulting evolution have yet been made, and they will be difficult to confirm even in the future, owing to the subsequent erosion of water and ice which obliterated and widened the shearing- and crushing-zones bounding the warped blocks. This assumption is, however, a logical necessity; without it the sculpture of the youthful mountain complex, with its steep valley sides, pointed tops and sharp crests, would be wholly inexplicable.

Odell (692), who discovered the 'inconsequent' drainage in the Torngak Mts, supposed that the valleys cutting across it might have originated from antecedent rivers that have maintained their courses against the uplift of the region. But at the same time he points out that the rectangular drainage pattern is clearly indicative of structural control. His explanation thus presupposes that antecedent rivers, running in the Torngak Mts before the uplift, were able to maintain their courses against the upwarping in late-Tertiary time. I think we must accept this explanation for the time as being the most probable.

From the inner range of the Torngak Mts the upland plateau slopes rapidly downward on the west, so that the district south of Ungava Bay is comparatively low, forming a vast, very flat trough, gently sloping towards the north. North-west of this depression the surface of the tableland again rises, so that its edge west of Ungava Bay fronts the eastern shore of Hudson Bay in bold cliffs, at the west end of which Cape Wolstenholme reaches over 1500 feet above tide (173). In the trough the water systems of the George, Whale, Koksoak, and Payne Rivers are located somewhat radially. Ungava Bay and its hinterland thus form a flat bowl, bounded towards the east and south by the present watershed which from the Torngak Mts decreases in height southward and reaches its minimum north of Mishikamats Lake at some 500 m above sea level. It is thus to some extent homologous to the Hudson Bay.

South from the elevated area the shores of Hudson Bay and James Bay are again low, and the land surface rises with a gentle and fairly uniform

slope of which the general gradient is 3.4—5 feet in a mile (173). Off shore, the water is very shallow, and flats, miles in width, are laid bare at low tide. This coast is thus more like that of Ungava Bay.

The northern borderland of the Gulf of St. Lawrence seems likewise to be of the warp or block-faulting type just described of the Torngak Mts (cf. 173). By block-faulting the palaeic peneplain has been vaulted up to a height of nearly 3000 feet (referred to the present sea level) in the south-west, at Saguenay and Moisie, but the amplitude decreases towards the north-east to perhaps some 750 feet north-west of the Straits of Belle Isle. From the notes available, there is some reason to suppose that the seaboard also here is made up of an upvaulted faulting zone stretching parallel with the coast, and the seaboard may sink in several steps towards the Gulf, as in the Torngak Mts. Here too, the borderland is characterized by the fact that the axis of maximum altitude lies at some distance from the sea and that the block mountain is transversed cross-wise by stream valleys which arise in the interior at a much lower altitude than the axis of maximum height.

Thus the uplifted northern shore of the Gulf seems to be in some important respects a morphological homologue to the Torngak Mts. However the block structure has not been deformed to such a degree as in the Torngak Mts; yet the valleys are for the most part very narrow, and the upper surface of the blocks are still almost level and lie more or less in the same general plane. Nearer the coast, on the other hand, the block system has been so strongly attacked by erosion that a mountainous land has arisen.

The watershed.

The drainage features thus prove that the broken-up peneplain of Labrador has been unequally warped upwards locally. In the profile of the Torngak Mts, Fig. 90, several portions can be distinguished unequally displaced from their original coherence. The examples can, however, not be limited to the seaboard. In the interior, likewise, partial blocks have been moving differentially, some have been tilted a little, others depressed, others uplifted relatively to the adjacent blocks. Even admitting the existence of a residual relief with great erosion remnants on the palaeic peneplain, I think no one will doubt our assumption that e.g. the Mealy Mts (cf. p. 172) is an upwarped block or series of blocks. There may, of course, be many other warped block mountains in the interior of Labrador, but the writer's knowledge of the land forms is too superficial to pick out further instances of this kind.

It was said that the divide in the Torngak Mts does not coincide with the culmination axis of the country, but lies a good bit to the west of it. It was also indicated how one ought to think that these circumstances may have arisen. In Tertiary time the district where the George and the Koksoak rivers now flow, like the bottom of Ungava Bay, originally lay higher than the districts to the east of it. The rivers of the interior of the peninsula flowed east to the ocean on the slight slope of the district. After the coast was raised the erosion power of the rivers was still able for some time to counteract the increasing reversion of the slope. This went on until the present Ungava Bay and its upland began to sink and the George River arose, probably in consequence of a rift zone mainly parallel to the central trough and the rift zone of the Atlantic coast. According to PRICHARD, the watershed at the source of the Fraser River lies only a few miles from the George River at something about 2000 feet above the sea, and from the watershed the land falls steeply towards the George River. From this it may be assumed that tectonic movements also contributed to the fact that the rivers, which once flowed from farther in on the peninsula and of which the lower parts are now marked by the Atlantic streams, were cut off by a north-south dislocation zone, so that the western side sank and the eastern was lifted relatively. It should be remembered that the prominent, somewhat broken fault scarp which divides the triangular peninsula between the Atlantic and Ungava Bay into an easterly highland and a westerly lowland (see V, sheets Nos: 1 and 5) lies in the same north-south direction as the George River valley. From the descriptions available this river seems to be walled in by high mountains from the east whereas the land toward the west is much lower. Now, when the rift arose and the land west of it was somewhat lowered the contributions of water ceased in the lower parts of the Atlantic rivers, and the greater part of the atmospheric precipitation which earlier ran into the Atlantic was now caught by the George River and directed into Ungava Bay. The divide in the Torngak Mts had come into exsistence.

To the north in the Torngak Mts, where the trough-shaped valleys were deepest, the anomalous relation between the watershed and the culmination axis is most distinct. To the south it is gradually effaced. It is there disturbed by glacial erosion or filled in by moraine gravel and shifted from its original position so that reconstruction is difficult. At least in the neighbourhood of latitude 55°, things are normal. Here it may be assumed that the local departures from the mean level due to displacements were insignificant.

The »height of land» or watershed running east-west on the south-east part of the peninsula attains in the west from 2200 to 2300 feet south of Ashuanipi Lake. CAYLEY (140) measured a hill here near the Moisie River at 2214 feet, HIND measured the watershed itself at 2240 feet. Thence it sinks slowly to the east, and at the headwaters of Eskimo River it cannot be much higher than 1200 (?) feet. According to descriptions, the watershed here is so to say indefinite, the land is flattened out and formed of boggy, flat land and lakes and the divide is difficult to define exactly, but is scarcely more than 400 m above sea level. In the west the watershed appears to have formed the edge between a dissected peneplain facet towards the Gulf in the south and the Lake Plateau's almost horizontal facet in the north. The facet towards the Gulf of St. Lawrence is not much more than one hundred miles broad in the west; HIND says the Moisie River is not very long; the Indians talk about a great mountain from which ships in the sea — 'Big-Water' — can be seen looking south, and Ashuanipi, on the tableland, looking north (434). Towards the east-north-east the breadth of the southern slope decreases following TITFORD's map to ninety miles in the middle of the indefinite watershed.

It may be assumed from the spread of the Palaeozoic deposits on the northern shore of the Gulf that the southward lying surface has at some time previous formed the bottom of sedimentary deposits. But then it must be asked what kind of surface is it that forms the comparatively steep slope towards Hamilton River east of long. 64°? Conditions here are complicated. The edge of the facet is no longer straight, but in some places hacked out. This may be due to displacements or to the fact that erosion has worked its way headwards over the edge, or to the erosion of the inland-ice, or to the combined effects of all these three. A striking circumstance is that the rivers on the southern slope from Natashkwan River to the east do not take a direction normal to the Gulf coast in its upper course, but flow south-east, then to the south at about right angles to the northern shore of the Gulf. Such a condition cannot arise only through the erosion of running water, displacements must have cooperated. This is probably because the rivers in their upper course follow lines of weakness of a tectonic nature. Perhaps the upper parts of these valleys have been laid down in a sediment covering?

To the north of the southern watershed district, Lake Melville lies asymmetrically in a fan-shaped drainage system. Comparing the short tributaries from the south with the long ones from the north, we are forced to assume that here too erosion cannot have been the sole determining factor for the pattern

of the drainage system. It is most probable that displacement in the block mosaic has also here had a decisive effect in the shaping; it is a noticeable fact to support such an idea that the river valleys there almost follow certain repeated directions (e.g. Naskaupee River). Nor is this so far-fetched if it is remembered that the district around Lake Melville obviously forms a faulted land. I think therefore that the middle and lower sections of the Hamilton River originated mainly by the same geological processes (pp. 160 and 163) which gave rise to the George River drainage system.

If the Gulf coast is so turned that the northern seaboard of the Gulf covers that of the Atlantic, the Moisie district is laid upon the Torngak Mts, and the lower section of the Hamilton River upon that of the George River, there is a striking morphological homology between the land forms in both districts. Under these circumstances one must expect that the same morphological processes have been active in these two districts.

These riddles, however, can only be scientifically answered through thorough investigations in the future.

The metachronous character of the peneplain.

Hitherto our discussion has implied that the surface of the peneplain is a chronologically homogeneous land-surface. We have then in the first place thought of it as forming the old land-surface from the end of Tertiary time, and theoretically this is correct. Yet, a closer analysis will show that this 'general peneplain surface', apparently so homogeneous, is composed of metachronous parts, called facets, which have developed during widely-spaced erosion cycles.

The geocentrical distance of the peninsula's surface did not, of course, remain unaltered during the enormous space of time that elapsed after the Archaean epochs. Extremely slow regional up- or down-warpings and tiltings of the earth's crust occurred in proportion to the positive and negative changes of its weight. Nor did the sea level escape elevations and subsidences when the volume of water or the capacity of the ocean basins changed. These variable phenomena have evoked repeated displacements of the base level and concomitant changes in the limit between areas of erosion and accumulation. Thus periods of degradation and aggradation alternated.

We know already (cf. p. 112 sq.) that beds of arkose sandstone of Double Mer-Lake Melville type were laid down on the supposed rather level sub-Keweenawan or sub-Jotnian land-surface. These beds then

protected the surface from weathering and erosion for long epochs until, let us say partly during Tertiary time, it was exhumed and exposed anew to the attack of the atmospheric agencies and destruction took place. Much of the removal of these strata probably did not occur until even after the erosional processes were rejuvenated by uplift in Pliocene time.

It may also be stated that at least the southern part of the peneplain surface, south of the east-westerly divide, north of the Straits of Belle Isle, is partly formed of a very old land surface facet upon which the Palaeozoic sediment cover was laid down and which again came to light only when the sandstone covering was swept away from its basement, presumably in Tertiary time (cf. however p. 121). This sub-Palaeozoic facet is far younger than the peneplain surface of the Lake Plateau, which clearly arose through the exhumation of Keweenawan's sandstones basal surface. This facet is, however, to be regarded as young in comparison with the sub-Huronian facet lying under the sedimentary-pyroclastic Kaumajet series, and which, where it was exhumed in the interior of the peninsula, became assimilated in 'the general peneplain'.

In the far north the shape of the comparatively level land surface may give reason for the assumption that here is an old, exhumed peneplain, maybe the basal surface of the Palaeozoic deposits, of which e.g. the Akpatok Island is the only erosion remnant. Under these circumstances the bluff bordering the level surface toward the east, Fig. 82, should about indicate the shore-cliff of e.g. Silurian time. The former assumption is perhaps fairly correct. On the other hand, the latter seems not to agree with the topographical features, the bluff being a broken line composed of slight projections and indraughts, all bounded by straight outlines, and not like a levelled shore-line worked out by breakers and coastal currents.

From these few instances it may be inferred that the 'general peneplain surface' is a polycyclic one, compounded of many land-facets, developed in one district or another during different periods of the long era of degradation. Some of these surfaces were later buried under sediment covers and remained 'fossilized' until during new erosion cycles the covering strata were again removed and an old facet regenerated. The data available, however, are still very scanty and inconclusive, so this discussion is better postponed until topographical maps have been made and systematic investigation of the geology, rather late in starting, can furnish the indispensable premisses for an exact analysis of the surface forms.

The erosion remnants of different forms and sizes which rise upon the so-called 'general peneplain surface' also indicate that it cannot be a sole erosion surface of which all the parts were worn out synchronically.

The residual land forms, hills and mountains of the peneplain.

The peneplain is strewn with irregularly formed mountains and hills, more or less widely dispersed, and these give at first glance an impression of complete disorder. Yet in many cases a systematic connection can be found between their distribution on the one hand, and the structure of the bedrock on the other. They prove in addition to be residual forms, erosion remnants of formerly greater mountains. These facts give us some hints concerning the genesis of these smaller land forms. The history of their origin is however a complicated one, and we do not generally know enough about the geological and morphographical conditions in Labrador to enter into details.

Most of the hills and low mountains on the rolling plateau have arisen in long bygone times in the way already described of the narrow ridges and the steep peaks of the Torngak Mts: by the erosional dissection of a peneplain. However, as the youthful surface forms of the Torngak Mts have practically all originated by the dissection of the young Palaeic peneplain, the widespread hills, almost mature in shape, which rise from the peneplain itself, e.g. on the Lake Plateau, have arisen by the erosional destruction of an older, perhaps very old (exhumed Algonkian) peneplain, and they represent the last, disappearing, sparse remnants of its residual relief. Yet erosion remnants or 'monadnocks' of an older order are of course to be found even in the Torngak Mts; Odell (692, p. 317) for instance, writes of the jagged outline of the 'Four Peaks' group rising as erosion remnants above the uplifted Torngak peneplain. This group has thus been sculptured out from a peneplain older than the Palaeic.

The relative size and the outlines of these residual hills and mountains are most variable. It is not difficult to understand that this must be so. The rock ground of the peneplain, from which the remnants have been carved out, was, of course, moulded in proportion to the resistance of the rock: the rocks most resistant to degradation therefore still rise to some altitude in precipitous shapes above the average surface, whereas the less resistant rocks have been completely removed.

In this respect a good illustration of selective weathering and erosion is found at Indian Harbour Archipelago, where all the hill crests and ridges coincide with the outcropping, dark gabbro dikes; (cf. p. 91); Figs 48, 49 and 50.



Fig. 88. Looking south-west over the Torngak Mts from a position above th
along some of the ridges. Note the matu



the entrance to Ramah Bay. Remnants of the palaeic peneplain appear
te-cutting shown in the picture (275).

Mount Razorback in the Torngak Mts, which consists of charnockite, gives prominence to this ridge (3665 feet high) amidst the more destructible gneisses into which it has been injected (692); Fig. 92. On the other hand, some of the very narrow, straight valleys have probably come into existence by the weathering out of diabase dikes and subsequent glacial erosion; WHEELER (Fig. 1 in 1019) gives an instance of such a valley at Kairtorsoak, north-west of Nain. To this same cause I think the straight upper part of Gilbert River valley is also attributable. The gap, rather more than 300 feet deep, be-



Fig. 89. The enormous, ideally symmetrical cirque in the Kaumajet Mts north of the Bishop's Mitre (in clouds). Cf. Fig. 62. Photo the author, July 1937.

tween the sharp twin peaks of the Bishop's Mitre in Kaumajet Mts — Fig. 62 — is due to the weathering out of a basic dike, cutting the volcanic series (692).

East from Ungava Bay the surface, seen from a distance, is almost a level plain with only such modifications as are derived from the deeper wearing in a longitudinal direction of some of the softer strata, producing escarpments of no great elevation with gentle slopes from their summits. Here erosion remnants are not clearly shown in the plastic of the rocky surface (sub-Palaeozoic facet ? cf. p. 166). The elongated pattern of e.g. the Button Islands reflects the influence of the structural conditions of the gneissic rock

ground, the more resistant strata standing out as parallel ridges. Most of the bays between Domino Run and Hamilton Inlet are inundated so-called strike valleys due to the weathering out of some less resistant strata, Fig. 81.

On the Lake Plateau (cf. p. 218) it is obvious that the long mountain ridges coincide with the most resistant strata, especially quartzites, in the roots of the smoothed-out pre-Cambrian 'Labrador Range' (Kaniapiskau series), and that these 'härtlinge', here, as for instance in the Gotho-Karelides of Fennoscandia, determine all the main orographical traits and the whole hydrographical system. e.g. in the surroundings of Lake Petitsikapau; Fig. 181.

The dikes are paradoxical in a morphological respect. We have found narrow diabase dikes forming narrow valleys after having weathered out. On the other hand the remains of a large outcropping dike of diabase, cutting through the gneiss on the mainland south of Manak Island have given rise to the Micmac Mts, which rise prominently to approximately 350—400 m high south-south-west from Makkovik. Mokami Hill, some 350 m high, occupying a position which controls the whole district west of Mulligan Bay in the Lake Melville area, is remarkable; it is a large 'island-mountain' with steep slopes and convex crest. Most of the other hills in the interior of the country are rather widespread and isolated, seldom rise more than 200 m above the general surface and are of varied type.

— Evidence of the existence of at least two stories of levelled surfaces can thus be observed in the great morphology: a surface laid over the crest of the mountain remains and a piedmont surface. Possibly there are also remains of other levelled surfaces of a lower order, forming perhaps even piedmont steps with numerous spurs. No scientific statement can yet be made on this matter —.

The surface forms of the anorthosite massifs are distinguished by a peculiar shape and immediately attract attention; the larger ones have smoothly rounded summits and their surprisingly smooth, grey slopes are almost wholly bare of vegetation and plunge very abruptly on every side. Figs 45, 46 and 70.

Most interesting are the remnants of the already described (p. 100 sqqq.) and earlier probably widespread, block-faulted Kaumajet Mts., 1000—1300 m high. Nowadays they cover an area probably no more than 150 square miles, but what they lack in extent they make up for in shape (692): the amazing abruptness with which they front the ocean on all sides is surprising. Perpendicular cliffs of more than one thousand feet are not infrequent; Figs 52.

55—62. As already reported, this mountain group is built up of sedimentary and volcanic rocks, and while the sediments and tuffs at the base are weathering out, the resistant cover of lava protects the upper strata until the overhanging projecting parts of the roof are removed by breaking off. The mountain sides have been moulded and somewhat smoothed by glacial erosion, but one must suppose that the cover at the top still projects in many places.

In several cases, however, not only the petrographical characteristic of the rock and its resistance to weathering but also the tectonic structure of the rock ground have influenced the rise of the mountain forms. In some cases too one is compelled to assume that some mountains considered as monadnocks owe their origin to faulting.

Among such erosion remnants the huge mountain mass of the Mealy Mts is conspicuous. This collective horst, reaching from the southern shore of Lake Melville to Sandwich Bay, has attracted the attention of all travellers in this district because it is to be seen about 70 miles from the ocean (cf. also the Canadian chart No. 420 of 1930). This upwarped mass of gneiss and granite, and near the shore of Lake Melville of anorthosite, rises steeply out of the tidal Lake Melville to 900—1220 m above sea level forming a long, dissected block mountain, with a series of summits — partial blocks with rather even surfaces — which must once have belonged to the surrounding peneplain some 1000 m below. After having skirted Lake Melville for about twenty-five miles, the range gradually leaves the shore and continuing in a south-westerly direction is cut by the Kenamu River, then, running some thirty miles further in the former direction, it is finally lost in the confused mass of hills that fill the interior of the country (434, 523). — Possibly the mountain range south-west from Sandwich Bay is of the same origin.

The worn topography of hogbacks and cuestas found in the areas of tilted sediments and diabase covers at Koksoak River is there in closest accord with the geological structure, as in the Kaumajet Mts (cf. p. 151).

Probably of the same origin is the rocky country around the Naskaupee River, which MacLean characterizes as very undulating and likens to the ocean when agitated by a storm, supposing its billows transformed into solid rocks (610).

Between the morphological effects of the erosive and the tectonic forces complicated combinations are to be found.

Many of the long, narrow lakes (cf. V and Figs 79 and 102) lie between tilted partial blocks, being diminutives of the Lake Melville and Double Mer

type. There the straight, steep shores without islands, indicate approximately the position of an edge of a faulted block, but of course the slope has, as a rule, because of the backward working weathering, been pushed somewhat towards the land from the fault. This is obvious especially in the case where the tilted block slopes in towards the land; Figs 40, 42 and 314.

Where the coast is fringed with islands or perhaps archipelagos these partial blocks occur which as a rule slope slightly out towards the sea. These blocks have become to some extent drowned, and it happens that only the highest parts of the residual relief upon their weathered, rough surfaces reach above the water. According to the degree of tilting the coast is bordered by a more or less extensive archipelago with islands, rocks and shoals. The greater or less closeness of these islands and capes in the archipelago is due to the character of the residual relief of the partial blocks and the amount of drowning. In the district round Nain, where the sinking has been less, the land is less covered by water, forming a mountain skerry-fence and conditions are just the opposite to what they are in e.g. Hopedale, where the blocks have sunk so deeply that only a few of the highest parts of the residual relief are visible above the water; Figs 85 and 38 c. After the ingression, there arose a rich underwater archipelago, just as dangerous for navigation as that at for instance Hangö in Finland.

In this way the rise can be explained of the curious topography which is found in several places in the dissected coastland bordering the Atlantic, with its straight, very narrow, long bays and sounds — t i c k l e s, r u n s — in different directions, and islands of all sizes and of geometrically similar shapes. A skerry-guard of such origin, one of the most remarkable in the world, lies in the neigbourhood of Nain (see above and chart No. 265, 1936).

The physiographic effects of the Quaternary Inland-Ice.

The above account can be summed up as follows: At the end of Tertiary time we should have found in Labrador a rolling rocky plateau bounded abruptly towards the sea by high mountainous borderlands in the northern section of the Atlantic coast and along the northern shore of the Gulf and the River St. Lawrence. In the extensive peneplain the rivers had worn deep valleys, where steep-walled gorges, youthful in type, alternated with widened-out stretches of more mature shape. After the drowning of the lower ends of the river valleys, a ria-coast with funnel-shaped estuaries had arisen. The

great surface forms of the peninsula would scarcely show any very thorough difference from those of the present. However, the landscape must have looked very much more mature than in our day. The outlines of the land forms had been greatly smoothed by weathering, and the small hollows and cracks had been flattened out by being filled with masses of gravel from the weathering and all the heights were as if scree-floods had been poured over them.

From the working of the Quaternary inland-ice this landscape became fairly thoroughly remodelled in detail and the peneplain received its final moulding. In these days the eye meets everywhere in Labrador the impress of the glacial work: rounded rocks (exceptionally roche moutonnées with striae), heaps of morainic gravel and masses of fluvio-glacial deposits which form outwash plains, eskers and 'dead-ice landscapes' as well as valley-trains.

The main objects of the writer's investigation in Labrador were to make clear the late-Quaternary geology, the glacigene morphology and especially to find out the sequence of changes of level. He intends to publish a special treatise on these matters when his researches are concluded. It therefore seems unnecessary to enter into details here, and only some fundamental traits will be described. As concerns the changes of level, he writes with every reserve, knowing that some corrections can be necessary when the observations made have been supplemented by new field-work.

The radiation centres and the direction in which the inland-ice has overrun Newfoundland-Labrador.

In central North America at least four separate ice advances of the Quaternary ice sheets have been demonstrated (16 a). The pollen flora with *Pinus, Abies, Picea, Betula* and some other plants contained in the interglacial beds at the Soweska, Opazatika and Missinibi Rivers on the James Bay slope in the Moose River Basin have given convincing proofs of the successive retreat and advance of the ice-sheets (22 a). In places two moraine sheets have also been found separated by stratified sands, gravels and peaty beds in the Hudson Bay area (174). On the other hand in eastern Labrador, as far as is known to the author, no beds have yet been met which, because of the fossils they contain and other circumstances, can be referred to different ice ages or interglacial times. It is evidently not safe to attribute all the effects of the glacial work here to one single, general inundation by inland-ice, even if no remains of interglacial deposits have been found. Thus, although so far no evidence of multiple glaciation has been found, all the glacial deposits and land forms

in Labrador will for logical reasons be here referred to the last Ice Age — the Wisconsin ice-sheet — until further information demands another classification.

The experience gained by the author during more than a quarter of a century's investigation in Fennoscandia (cf. e.g. Bull. Comm. Géol. Finlande, Nos 38 and 88) has been so to say fully confirmed in Labrador. Here too there is reason to assume that in the inland-ice no centre or centres of radiation had any fixed position, but that they have been subjected to shifting concomitantly with all the considerable changes in the meteorological conditions. It must be thought that when the ice was shrinking in one district it was still increasing in another. In consequence of this, the radiation axis, the so-called 'ice-divide', cannot be assumed to have formed any real line of separation as is often represented on the maps, but it must be thought of as forming something of a mathematical locus. The composition of moraine beds and directions of transport for the erratica in Fennoscandia show that considerable deviation occurred between the lines of propagation during different stages of the glaciation, and that in some places even an inversion of the direction of the ice's movements occurred in late-Glacial time. Corresponding variations can be expected in Labrador.

According to Low, the observations of his time showed that the radiation centre of the inland-ice must have stretched almost over the Kaniapiskau Lake, in the heart of the peninsula, in a westerly direction as far as to the junction of the sources of Big River at about long. 72° and thence further to the north-north-west towards Cape Dufferin. Newfoundland-Labrador lies wholly to the east of this radiation divide. Low moreover was of the opinion that the centre of maximum glaciation shifted its position progressively northward.

Later on Odell (692) found in the northern part of the peninsula between the Atlantic and Ungava Bay that on the summits and open areas, free of the constraining influence of the valleys, *roches moutonnées*, striations, furrows etc. indicated an ice-movement mainly towards east-north-east, though it would also appear that the flows in the ice sheet had a direction more nearly north-east during part of what was probably the earlier and maximum phase of its existence. This would indicate a centre of dispersal considerably northward from where Low, from evidence in the far interior, had suggested its location during the later stages of glaciation, i.e. more in the neighbourhood of the headwaters of the Koksoak River or even farther north than between lat. 53° and 55° in the centre of the peninsula, as he had surmised. This conception thus supports Low's thesis of the shifting divide.

In the opinion of the writer, the ice masses which moved from Labrador across the Straits of Belle Isle and the Gulf of St. Lawrence and overran the northern part of the Long Range in Newfoundland (919 a) in a south-south-easterly direction most likely started from a radiation locus in the centre of the Labrador peninsula. When the ice-sheet began to withdraw the radiation centre migrated farther towards the north or north-west (cf. p. 175).

According to present day views regarding the continental glaciations, it is questionable whether reliable facts give sufficient support for the generally accepted opinion that Labrador during the climax of the Glacial epoch formed an individual centre of glaciation (cf. 16 a). Moreover, the writer must ask what prevented the Labrador ice during the maximum extension of the land-ice from debouching from one great connected Laurentian ice-sheet (cf. Labrador-Keewatin ice-sheet, 204 a), which reached its greatest thickness approximately in the area now occupied by Hudson Bay.

If the uplift is admitted to have been a rebound from the depression caused by the weight of the inland-ice (cf. p. 229) it may be assumed that the weight and thickness of the ice-sheet was roughly proportional to the amount of late-Quaternary uplift. It has therefore been inferred from the studies by Cooke and others that the inland-ice was thickest around the east shore of Hudson Bay and thinnest along the Atlantic coast (cf. Fig. 4 in 174). It may be concluded, that under these conditions an ice-emission centre in the interior of the Labrador peninsula is not probable, but it must have been lying farther west during the maximum of ice thickness. The few observations on the western side of Labrador of striae which indicate an ice movement toward the Hudson Bay do not contradict this conception; the reversion of the ice movement which the direction of the striae undoubtedly indicates is a normal phenomenon and should be explained in the same way as has been done for the northern parts of Fenno-scandia (Hamberg 1910, Tanner 1914). The occurrence of migrating radiation centres in such extensive inland-ice seems most probable. They must have shifted now here now there in agreement with the changes in the atmospheric circulation, which was partly caused by the glaciation itself (cf. J. C. Simpson in Quart. Journ. Meteorol. Soc., Vol. LX, p. 425, 1934, and Baulig in Ann. de Géographie, Année XLIVe, p. 561, 1935). At the marginal belt of the inland-ice covering such shifts of the dispersal centres may have caused overlappings and thorough changes in the directions in which the ice masses moved.

All opinions agree in the conclusion that Newfoundland-Labrador during late-Quaternary time always lay east of the radiation centres. However, at this moment we have not the slightest idea of the exact location of the corresponding radiation centre or centres of the inland-ice during its maximal extension, nor are the directions known in which the continental-ice moved over our district during its stage of maximum thickness. To establish this would demand comprehensive knowledge of the dispersion of the leading

erratic blocks on the peninsula. In any case the fundamental condition for this is a thorough knowledge of the petrographic structure of the rock ground, and the exact extension of its component types from which the erratics originate. But today we have no detailed petrographic map of Labrador and it will probably be a long time before such a map with sufficent exactitude is constructed. Not until we have the petrographic map can the mother cleft of the erratics be found and their dispersal directions be defined. The procedure, in a case like this, of allowing a map showing the distribution of the glacial striae to take the place of a survey of the directions of the movements of the glacial 'leading blocks' is not appropriate and must lead to faulty conclusions. All the glacial striae in the *roches moutonnées*, with a few exceptions perhaps, were caused by the movement of the ice-margin. Thus, as a rule, the striae only register the movements during the very final phase of glaciation in an area, and there is nothing to show that this direction coincided with the ice movement at the same place during an earlier phase. The striae are, if we go from the periphery in the direction towards the centre of the dispersal, decidedly metachronous, the more peripheral being older, and therefore the indications left by them are only exceptionally comparable. A map of the striae is consequently valueless if one extends its importance beyond the presentation of the striae observed and e.g. will synchronize their indications. As previously stated it is not only possible, but in many cases probable, that the inland-ice in the central parts of the peninsula during the time when the striae in e.g. the Hopedale area were formed moved in quite a different direction from that indicated by the grooves in that district (cf. e.g. 56, 200, 195 a). Not until we have at our disposal both a petrographical map and a reliable map showing the directions in which the erratics have moved in the different places is there any possibility to attack this problem from a geological point of view.

Towards the final phase of the glaciation the margin of the inland-ice moved forward in an easterly direction over the coast of Newfoundland-Labrador, within the northern part of the Atlantic coast on the average towards the north-east, and east-north-east and in the south-eastern parts of the peninsula on the average towards the south-east and south-south-east. There are striae on the northern shore of the Straits of Belle Isle which indicate an ice-movement toward a south-south-west direction (see map on 159 a). This, however, does not imply any contradiction. When the inland-ice became thinner during the melting phase, the direction of the currents in the ice was more or less wholly controlled by the topographical features and especially by the directions of the valleys and bays. — (Cf. 429, 694, 698, 704, 705, 706).

The onset of glaciation.

At the onset of the continental glaciation the snow-line sank slowly still deeper. In the north the endless array of lofty, cold peaks and mountains near the ocean where moisture-laden winds were more frequent, became finally covered by snow and ice patches. In spots protected from the presumably prevailing winds from the north-west the snow transported by the blizzards came to rest and was soon transformed by recrystallization into ice. The Torngak Mts became the most important collecting ground of snow and ice, out of which the cirque-glaciers grew in valley-ends carved out by the sources of the rivers in pre-Glacial time. By the action of these small ice-masses, the glacierettes, deep cirques were gradually eroded out and we shall find their stamp in abundance all over these mountains; Figs 25, 26, 28, 86, 91—94, 87, There are great cirques even close to the present sea level especially in the Kaumajet Mts; Figs 89 and 61.

On the northern end of the Kiglapait Mts the valleys worn by such local glaciers are of the small hang-glacier type; Fig. 95.

The southernmost cirques observed by the writer are on the north-west slopes of Aulatsavik Island at some 500 m above sea level; thus the lower limit for the distribution of the cirques rises towards the south and the interior.

As a rule, the cirques are mostly situated on the eastern flanks of the mountains (694), and this indicates that during the winter about the same seasonal wind prevailed as to-day.

In the extreme north no signs of cwm-cutting has been observed; cf. Fig. 97.

The island Nanuktok, Fig. 93, is a good instance of a mountain group having been very much dissected by the local cirque glaciers. This picture is instructive in another respect too. Here the knife-edge ridges once produced by the cirque walls have been partly demolished by the later grounding and scouring of the inland-ice. Cf. Fig. 94.

Cirques from two stages of glaciation are to be found: pre-Glacial cirques and late-Glacial.

When at the beginning of the glaciation the local glaciers were at work, the cirque action scalloped out especially vigorously the sides of the coastal range, and in most of their groups, such as the 'Four Peaks', Mt Tetragona, and Mt Razorback, Fig. 92, and others of the mighty coastal mountains, the dissection by cirque action proceeded so far that the whole of the Palaeic erosion-surface

was finally destroyed. The Torngak Mts, as a whole, can therefore be called a classical example of a landscape dissected by the local glaciers, a labyrinth of cwms and corries. The ice-masses of these glaciers have there eaten out enormous niches deeper and deeper, finally wearing away the dividing walls too, and transforming the area so thoroughly that one of the wildest miniature alp-landscapes thinkable has arisen there, Fig. 25. It is indicative of its ghostlike character that the Eskimoes' imagination has placed here the kingdom of fear and the abode of the torngak spirit (see further on). The natives avoid this country, they feel here the presence of the evil spirit, the Torngak, the implacable enemy of human life, who sometimes devours them in the wild blizzards of winter. The mountain cluster has its name — Torngak Mts — from this fancy (205, 445).

On the other hand, more to the west of the coastal mountains remains of the Palaeic surface can still be seen, Figs 27 and 28, and all stages from youth to maturity in the cycle of mountain glaciation are represented.

— In the Torngak Mts small [disappearing?] glacierettes (692) or 'Miniaturgletscher' (528) are still to be found, and active cwm-cutting by them is still continuing; Figs 98 and 99. Maybe there are also some cirque-embryos that must be wholly attributed to post-Wisconsin action. In some valleys, in which there are series of terminal moraines, the one inside the other, it is clear that the present little glaciers were once much more extensive than now. An intensified local glaciation of this kind is also known from late-Glacial time in Fennoscandia (Enquist, 1910; Holmsen, 1915; Grönlie, 1914; Mannerfelt, 1940). This phenomenon, however, demands special and thorough investigation before general conclusions can be drawn for Labrador (cf. 692, 694, 157). —

The mountains having been completely submerged by ice during the maximum glaciation (p. 185), cirque erosion must have been checked until the time when the summits emerged and reared their heads above the lingering ice-flood, forming for a long period a rocky archipelago in the Mer de Glace. The cirque-dissected mountains are for the greatest part near the coast and this has been interpreted to indicate that they must have raised their heads above the ice-covering for a longer time than the westerly mountains which long remained protected by the continental-ice (692). Not until that receded from the interior range did the mountain flanks there become accessible to the cirque-cutting. Yet the question must be asked to what extent the greater cirques were at all cut during the late-Glacial period, or whether they already

existed at the beginning of the last Ice Age, and after that were inundated and preserved by the inland-ice. There seems to be some support for both opinions, and the truth is probably to be found in both.

We shall suppose that as a rule the mountain glaciation and the cwms originated at the commencement of the last Glacial (viz. Wisconsin) epoch also here. The reason is the complete absence of remains of frontal or recessional moraines of such a size as should bear some reasonable relation to the rock masses worn out from the cwms. But of course the cirque-cutting can have been repeated after the maximum of general glaciation at places from which the inland-ice had withdrawn, if conditions there were favourable.

With cwm-cutting the Ice Age had begun. The augmenting nivation formed still more glacierettes which continued to grow. They became valley-glaciers, which amalgamated as piedmont bulbs, growing higher and larger until finally the whole mountain was under ice. The further developement, the way in which the ice-cap of the Torngak Mts became connected with the continental ice-cover in the west cannot yet be scientifically confirmed because we do not know enough about the dispersal of the erratic blocks and of the meteorological conditions of those remote times (cf. however, Enquist, 1916, Simpson, 1934).

The extension of the inland-ice-cover.

A striking feature of the south-eastern parts of the coastal belt mentioned by many travellers is the seemingly complete absence of morainic deposits. Even above the shore-line registering the highest limit of late-Glacial submergence, the only glacial accumulations are an infinite number of isolated, sometimes colossal, erratic boulders, resting on bare rock all over the district, as well as small gravel patches as much as a few feet in thickness. The rest of the finer material deposited by the inland-ice seems to have been carried away already in long bygone times by strong solifluction and glacial melt-water action, and below the marine limit the breakers of the ocean have, in their turn, washed the rock ledges almost clean, while pans from the loosened ice-foot have borne away most of the blocks. In many places there is so little soil that it is difficult to pitch a tent. Some idea of the extremely sterile character of much of the coast is gleaned from the fact that at e.g. the Bay of Tabatière, west of Cape Whittle, the missionaries had difficulty in finding sufficient earth to form a burial ground; at some of the stations bodies have been buried in clefts or crevices of the rocks (434).

However, it is only necessary to move some tens of miles inland to find the surface composed of normal drift and ice-worn rock, so characteristic of glaciated areas. It is therefore not surprising that travellers who have seen the outer coast belt only believed that the land, especially in the north, has never been entirely covered by inland-ice. In 1860 LIEBER (575) noted that the craggy peaks of the 'wild, volcanic-looking mountains' on the mainland opposite Aulatsavik Island [Manvers Run] had evidently never been ground down by inland-ice. In 1884 BELL (55, 56) stated that the steep, rough-sided, peaked and serrated mountains round Nachvak had never been glaciated; he believed that throughout the glacial period the tops of the coastal range had been above the ice, especially in the high northern part, and he estimated the average elevation of the local valley glaciers at about 2000 feet above the present sea level. Roughly the same idea was formulated by KOCH (528) in 1884. The peaks of these northern mountains were found not to have been glaciated, but angular and rugged, not rounded by attrition but split by frost (98 b). All these observers came to the conclusion that the alpine character of the mountains has been preserved from pre-Glacial times and that the continental ice-cap did not cover e.g. the Torngak Mts. DALY (200) in 1900, considered that during the Glacial Period the Torngak Mts formed a great dam facing the ice masses from the dispersal centre of Labrador. However, he found here and there evidence that tongues of the inland-ice had crept over the low, transverse passes towards the east and reached the ocean. Glacier-gouged trough-valleys were modelled where the ice-tongues from the inland on the western side traversed the ranges; cf. Fig. 96. DALY did not find ice-polish and *moutonné* forms, side-moraines or other evidence of these ice-tongues veryhigh on the valley sides, never higher up the slopes than 1600 to 2100 feet above sea level. Higher up the slopes, north of Nachvak e.g., were found covered by more or less connected fields of blocks with sharp-edged stones and splinters of the subjacent rocks, and DALY considered that these masses of blocks formed pre-Glacial weathering gravel and that therefore only tongues of inland-ice had reached the ocean over the valley passes whereas the ranges had appeared in the form of gigantic nunatakks projecting up to 4000 feet. A decade and a half later, COLEMAN (157), after examining the Nachvak region, claimed that not even the tongues from the continental ice-sheet had ever been able to reach the ocean through the Torngak valleys. His criterion that the Wisconsin-ice did not cover the high summits, was particularly the fact that fields of boulders consisting of the subjacent rock are widely extended in the highest parts of the mountains, and that the jagged forms, peaks and knife-sharp ridges could not have remained if they had been overrun by the continental ice-sheet.

He did not take into consideration the potentiality of the rapid frost action which increases as one approaches the upper denudation surface (cf. 692).

Coleman was thus stricter in his conception than his predecessors Bell, Koch and Daly; his opinion was that only a local mountain glaciation had occurred there in the Torngak Mts. From this time the hypothesis developed and took general root that these northern mountains had formed nunatakks above the ice-sheet. This opinion was readily adopted especially by the botanists; cf. Fernald (258).

Later on, Coleman formulated the idea that not even the south-eastern part of the peninsula had been covered by the continental-ice during the Wisconsin stage. In a sheltered spot at Cartwright he had found hard ancient till and *moutonnées*, weathered into fine débris, and this led him to assume that these were due to a glaciation older than the Wisconsin (159 a, 161 a). Referring to the southern shore he stated that the whole Gulf region had escaped general glaciation in the last part of the Pleistocene (159 a).

The present writer cannot agree with Coleman. In Sandwich Bay, neas Cartwright he found at Duck Island the finest *roches moutonnées* with still lustrous surfaces full of fine striae and deep grooves from N 73° W and W 3° S and at Supporation Point from W 23° S. In the lustrous *roches moutonnées* on the southern shore of Double Mer east of Pompus Head the direction of the striae was west to east. Striation on uncovered rock could never have survived an interglacial epoch in this climate, with its rapid mechanical weathering. The striae noted by Coleman (map in 159 a) especially in Forteau Bay in 30° east of north, taken together with the splendid *roches moutonnées* with fresh striae from north 35° west in the southern part of St. Anthony (919 a) prove decisively not only that this corner of the peninsula has been completely covered by the last inland-ice but it has been ice-covered at a very late stage too.

Coleman also mentions, as an argument for non-glaciation in Wisconsin time, that he found the gneiss on Caribou Island weathered to a depth of two or three feet. The writer has never visited this island but he has observed the same phenomenon on the Atlantic coast, for instance on Ragged Island and George Island. On the former place the disaggregation is due to the well-known swift weathering of the nordmarkit-rock due to local petrographical properties of the rock, for the finest striae are still to be found on polished rocks in some spots; cf. Figs 64 and 65. On the eastern slope of George Island in Hamilton Inlet the weathering in the hornblende gneiss seems to have some connection with a *tafoni*-process; cf. Fig. 128.

Superficially there is thus much to suggest that an ice-sheet never covered

entirely the land in Torngak and Kaumajet Mts, and the jagged and broken character of the coastal groups has, as already stated, been referred to as forms that have escaped ice-planation. From his observations in the Arctic ODELL (692), however, deduces that the occurrence of extensive fields with boulders and debris of the subjacent rock depends very much on local circumstances. High terrain in a region of severe frost action in proximity to the sea, with frequent ample, moisture-laden winds produces thick coverings of frost-riven, stony soil, all of it later than the disappearance of the continental ice-sheet. Likewise, a more plausible explanation of the jagged peaks and sharp ridges is the action of the same severe frost since their emergence from the ice-covering. ODELL was strongly impressed, e.g. in the Torngak Mts, with the parallel circumstances and conditions in Spitzbergen and North Labrador, though the latter was merely so much farther advanced in the glacial cycle. The potentiality of the factor of rapid frost action which he had learnt to know in the former country he considers is fully applicable to the latter, which is very similar in configuration too. The extensive and exasperating boulder-fields, 'Felsenmeere', that cover square miles of both the mountain summits and the slopes, are in ODELL's opinion almost entirely the post-Glacial work of frost-splitting and solifluction in the regions where the temperature fluctuates much on either side of freezing-point and the relative humidity is prevalently high. The glacial features which had arisen when the summits were covered by the last continental ice-sheet are, of course, so easily disintegrated and broken up that scarcely anything was left of them, or they had been buried under the frost-riven material that creeps down the slopes. — This is just what we know from the high mountains in Fennoscandia.

DALY had reasoned from the demarcation line between the vertical extension of polished slabs and the frost-riven block fields above them that the inland-ice, e.g. on the southern slope of Mt. Ford, could not have been more than 2,100 feet above sea level. But ODELL could not agree with DALY that this measurement was the maximum vertical extension of the inland-ice at Mt. Ford. Across the fiord, he says, a U-shaped col could be seen which according to COLEMAN is 2,590 feet above sea level, and another similar feature in the neighbourhood was equally eloquent of a time when the level of the ice approximated more closely to 3,000 than to 2,000 feet. Opposing COLEMAN's opinion, ODELL argued with DALY that the graded troughs with their clear evidence of ice-action, have partly cut the watershed and thus imply an outflow towards the coast of the inland-ice from the centre of dispersal far in the interior. But, contrary to what DALY found in the Torngak Mts, ODELL discovered that the ice outflow from the interior did reach up to the high sum-

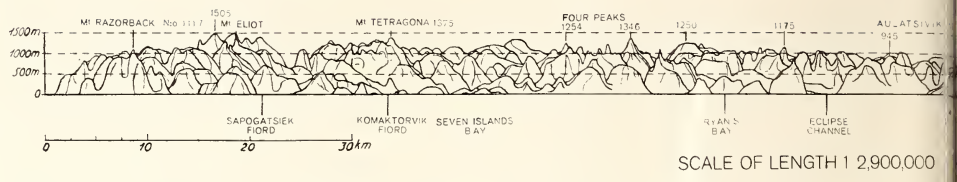
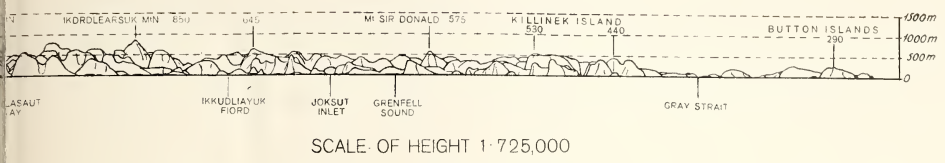


Fig. 90. Profile of the Atlantic Labrador coast between Mt Razorback and Button Isl
Forbes-Grenfell Expedition and drawn by L. E. Rosendahl to a scale of 1 : 300,000. Sc

mits. On one summit of the central range of the Torngak Mts there was evidence of ice-polished surfaces at 4,700 feet, nearly 3,000 feet above what was thought by others to be the maximum extension of the inland-ice. Some of these remains of ice-polished surfaces were to some extent corroded and the present erratic blocks are often superficially weathered. This is however not surprising, if due account be taken of the particular climatic conditions of the region. In the northern part of the mountains, at 2,250 feet above sea level, slabs were found with signs of glacial polish — evidence that the regional ice had moved across the range towards the north-east. On the south-east slopes of Point 3,620 feet in the Kaumajet Mts, Odell also found bare, coarse lava surfaces, showing ice-planation, though with partial decay, and it seemed to him probable that this planation was due to the last glaciation. Here no unequivocal erratic material could be found.

The opinion expressed by Odell, one of the most experienced and far-travelled glaciologists of our time, is conclusive for the writer. During our discussion in his home in Cambridge in 1937, he fully convinced me that Coleman's (157) and Fernald's (258) thesis that the higher parts of these mountains formed nunataks during the last ice age can no longer be maintained. The inland-ice of the Wisconsin epoch completely inundated even the highest mountains of the peninsula. Through the great transverse valleys of the Torngak Mts it sent mighty, relatively swift land-ice currents out over the continental shelf to the Atlantic, whereas the ice on the lofty upland moved but slowly forwards in the same direction. How far on the shelf the land-ice reached is a question on which the writer is not prepared to give an opinion. Apart from Coleman's opinion, mentioned above, there has been no difference of conception with regard to the fact that the inland-ice covered the country in the other parts of the peninsula. From the south-eastern corner of the peninsula it even reached Long Range in Newfoundland (919 a) so that its thickness in the marginal belt has been significant. Notwithstanding this the statement of Bell that glaciation seems not to have been so intense in



of the American Geographical Society's map (V in 275) based on the observations of the re blocks are seen which have been somewhat differentially displaced in a vertical direction.

Labrador as in the other parts of the Canadian Shield, and that the surface cannot be said to be as much mammilated here as elsewhere, can be correct. — (Cf. 16, 46, 157, 161 a, 437, 692, 694, 700, 713, 922, 1055).

Until new information may require a modified explanation we thus must conclude that the whole of Newfoundland-Labrador has been inundated by the Wisconsin inland-ice.

The glacigenic land forms.

Newfoundland-Labrador is most instructive regarding the rise of surface forms due to the action of the continental ice. Here, within a limited area, we meet the glacial forms characterizing the Fennoscandian peneplain as well as the forms of Alpine glaciation.

The effect of the inland-ice was partly erosive and partly accumulative. The forms which are direct effects of wearing down are called destructional, and those which have been built by processes of aggradation are constructional. In both these groups are to be found positive and negative forms having the nature of depressions.

Land forms due to glacial erosion.

When the inland-ice developed over the peninsula, the masses of weathering gravel and talus formations which covered the rock ground more or less thickly at the end of the Pliocene time were incorporated in its bottom layers (p. 173 sq.). In the inland-ice these masses of gravel became moraine, a firm agglomeration of ice and stones, splinters and powdered stone, and as this gravel-packed layer later slipped over the rubbed rock surfaces these were fretted and polished and their edges rounded. It is just the admixture of stony matter in the bottom layer of the inland-ice which rendered possible the ice erosion, for pure ice is not capable of this action.

In different districts the inland-ice has attacked the rock ground to a different extent. In Labrador, as elsewhere, the initial morphography of the

rock ground is seen to have exercised a decisive influence on the effect of the glacial work: while the peneplain surface with its ancient forms shows only comparatively small modifications by glacial erosion, the youthful valley landscape in the north-east has been powerfully remodelled.

The forms of the peneplain

thus retains the impress of glaciation, though it is not deeply affected by the inland-ice. The effect of the erosion has been slight, as is easily understood, for neither considerable difference in pressure on the rocky base nor in speed could arise in the inland-ice masses on the relatively level rock plateau; the ice mass was in an almost hydrostatic condition of balance with the stream-lines directed mainly parallel with each other. If, for the moment, we ignore the increased effect of the inland-ice on the bottom of the deep canyon valleys cutting the peneplain, because in these the individualized currents attained a greater speed if the direction of the valleys agreed more closely with that of the inland-ice movements, then theory and practice show that in general no powerful erosion has occurred on the peneplain. The erosive action there seems to have been limited principally to rubbing up and plucking out blocks from the fissured rock ground and to some grinding and scouring of the rock ledges. Here and there one can clearly see that blocks and splints have been thrown out from the cracked, rocky mosaic, rock edges have been rounded and in some places transformed into *roches moutonnées*, especially in the valleys in the coastal zone.



Fig. 91. Cwms in the Torngak Mts; in the foreground a glacierette. Looking south. Aerophoto Forbes-Grenfell Expedition, 1931.

At closer quarters, when the details begin to appear, the rock plateau proves to be less level after the inland-ice had passed over it: steep, small rocks and small rocky hills, separated by valleys, holes and crevasses covered much of the land surface with small hummocks. The smoothed terrain during

Pliocene time has thus got somewhat lost and the landscape again became broken and rugged in detail. Closely intermingled in the landscape are rocky hills, woods, water and swamps giving it an irregularly monotonous relief over large areas. It becomes a terrain not easy to survey. However, it is not only the eroded rock surface which decides the character of the relief; in most places the scattered heaps of glacial deposits have had a co-operating, if not a decisive influence: moraine gravel and fluvio-glacial gravel, now forming a level field, now a landscape of stony boulders and ridges and hollows, now slopes levelled by the action of the forces at work along the shores or in the fluvio-glacial rivers.

The slight relief of the rock surface in conjunction with the glacial deposits

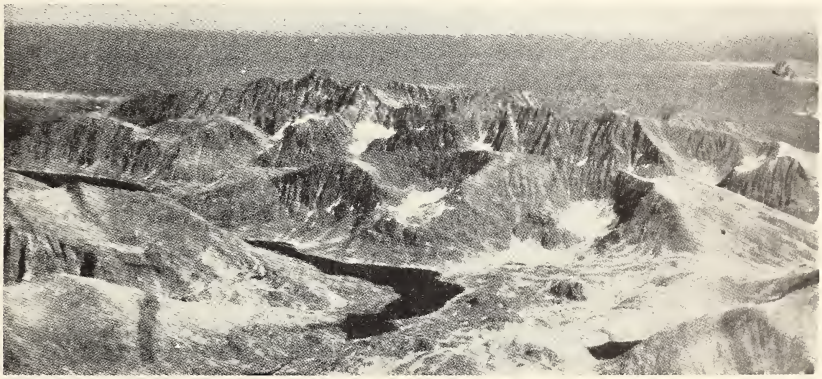


Fig. 92. Mount Razorback from the north-west. Note the diabase dike to the left. (Cf. Fig. opposite p. 26 in 692.) Photo FORBES-GRENFELL EXPEDITION, 1931.

are thus the two elements which combine to determine the appearance of the peneplain overrun by the inland-ice in Labrador. It was often impossible to distinguish from a distance between the influence of these two components. The horizon line, on the other hand, is still as good as level on this peneplain. The Pliocene erosion surface being *prima facie* a stream-formed peneplain of a very usual kind has however later been sufficiently modified on the average by the continental ice passing over it to warrant its being designated a g l a c i a l p e n e p l a i n (*sensu* ODELL).

The originally broken parts of the peneplain assumed a somewhat different appearance after the inland-ice had passed over them, e.g. far out on the northern end of the peninsula, on both sides of McLelan Strait: the crest lines composing the general level there are moulded into *moutonné* forms of all



Fig. 93. Nanuktut Island north from Cape Mugford. Looking from over Cape Mugford. In the far background is seen Watchman Island (275).

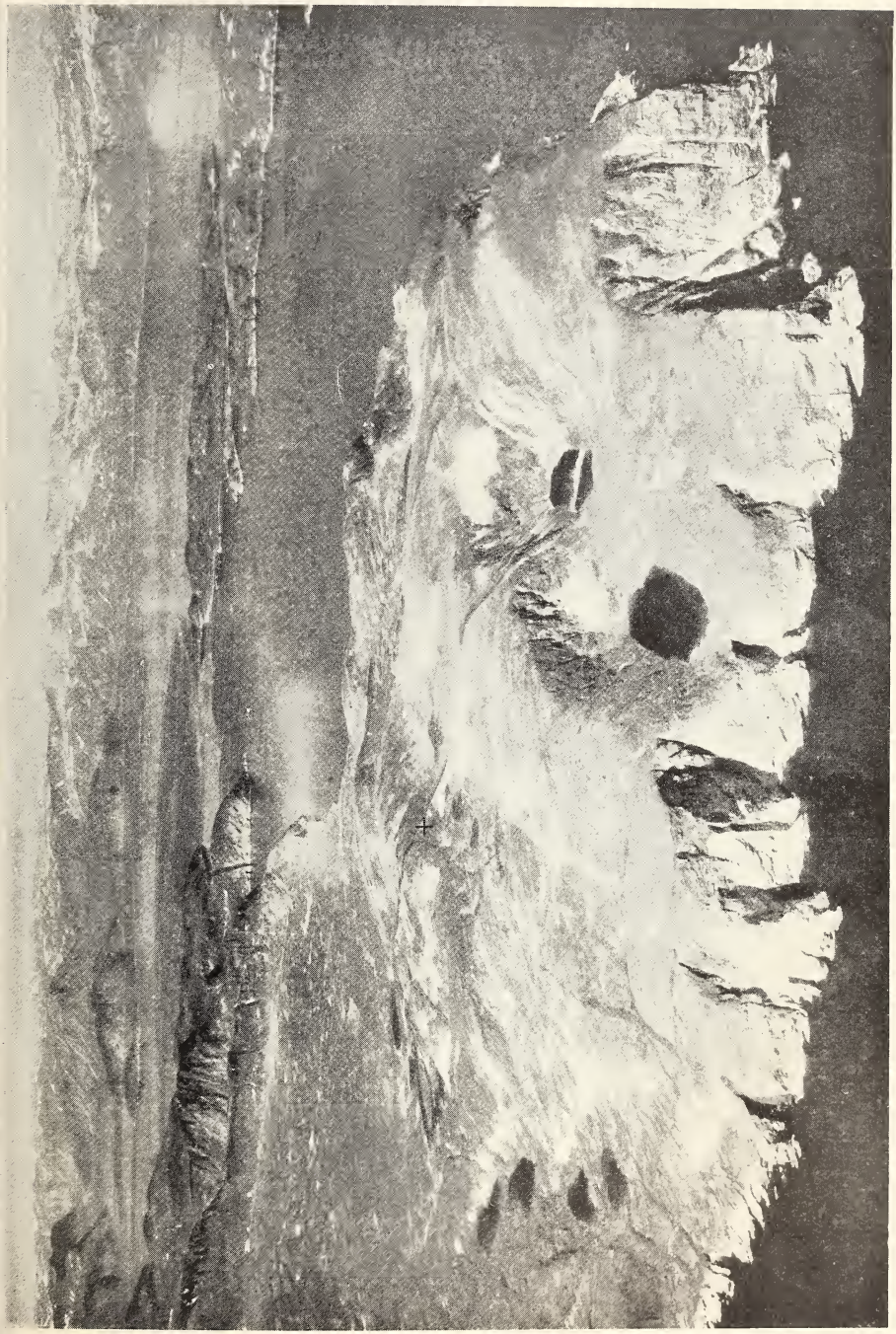


Fig. 94. Looking north-west over Saglek Bay. Cape Uivik in right foreground. Aerophoto Forbes-Grenfell Expedition, 1931.

sizes, many of which sink beneath that level; the prevailing character is steep lee sides on the east, gentle stoss or impact sides on the west whence came the continental ice. Glacial erosion has evidently been rather considerable here, Figs 31, 32 and 80 (692). The coast-line has become very complicated and cut up in these broken parts of the peneplain; Figs 81 and 100.

In the great rivers canyon-valleys just mentioned overdeepening by glacial erosion has probably been considerable, as for instance at Lake Melville, at Grand Lake, and at Lake Winnikapau in the Hamilton River drainage system; cf. Fig. 74; whereas in other places, where the valley widens, both downward and lateral glacial erosion seems to have been very moderate. At some places



Fig. 95. Looking from the north over the northern part of the Kiglapait Mts which are here some 1000 m high. To the left are seen the trough valleys carved out by short hang-glaciers. Photo the author, July 1937.

the tributaries enter the main river at its present level through rock gorges, on account of which Low stated that unless the drift beneath the river bed is considerable, the tributary valleys are not hanging so that no considerable overdeepening can have occurred. Lateral erosion has also been very inconsiderable. Cooke also has been inclined to minimize the extent of erosion during inter-Glacial and post-Glacial times (173).

Another conclusion is arrived at for the deep valleys in the Torngak and the Kaumajet Mts.

The forms of the youthful valley landscapes,

where the topography at the beginning of the Ice Age was distinguished by deep, narrow valleys with a relatively sharp fall towards the ocean, were on the other hand very strongly attacked by the erosion of the currents in the inland-ice.

There are few areas in the world which show such highly developed c w m-c u t t i n g by miniature cirque glaciers as the areas in the Torngak and

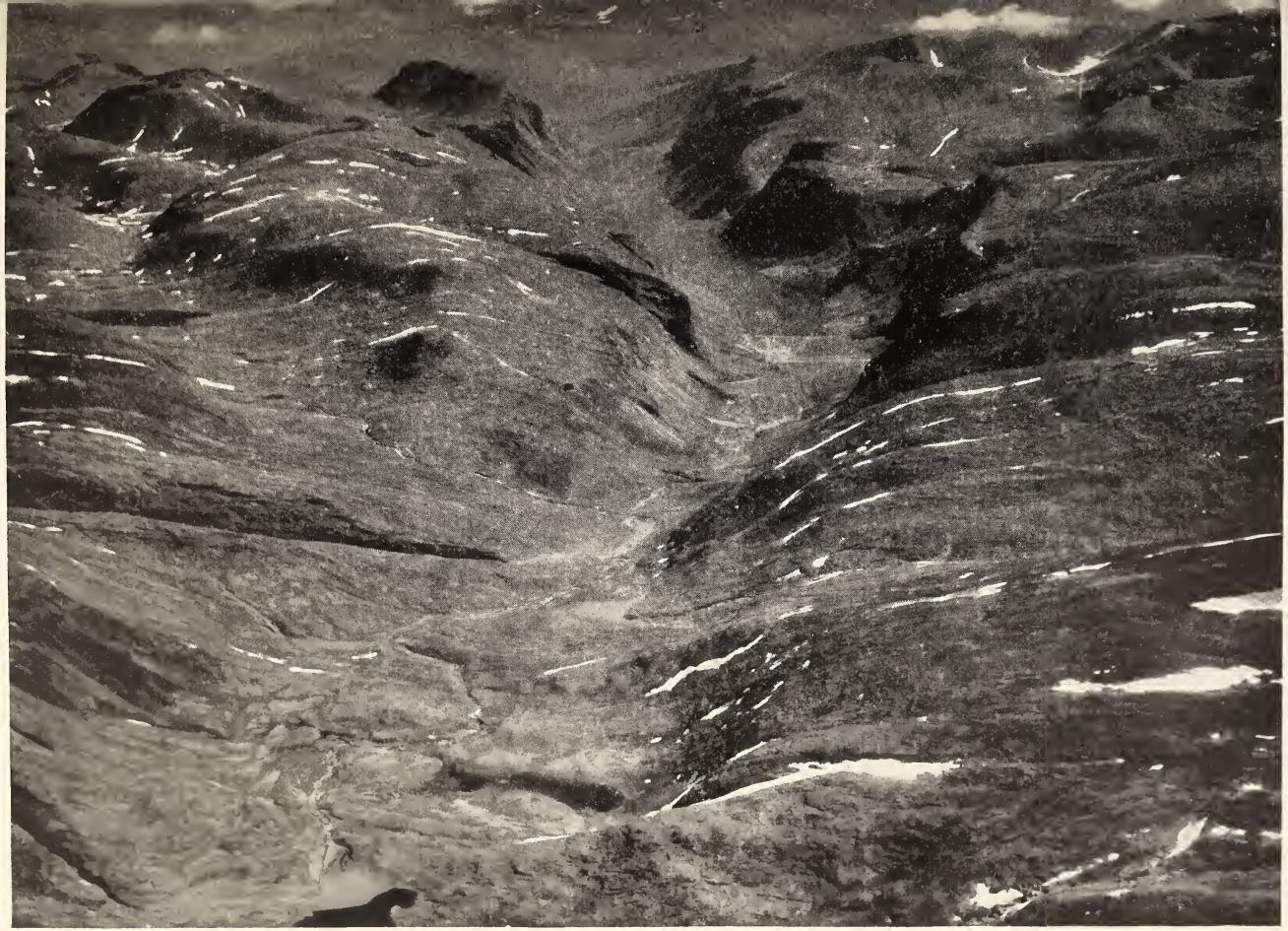


Fig. 96. A 'non-consequent' stream descending in a trough valley to Upper Komaktorvik Lake as seen from the west. Note the different U-shaped valleys that were occupied by ice at various stages of the late-Glacial and post-Glacial epochs (275).

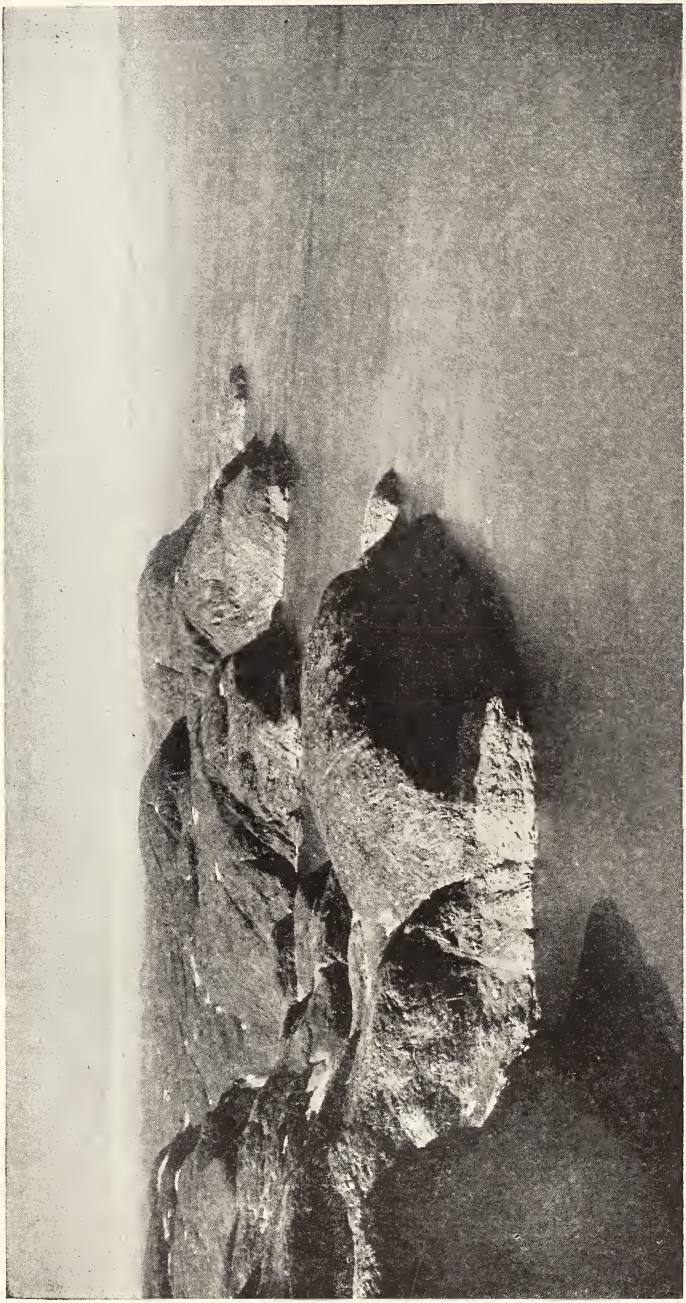


Fig. 97. Looking north-west from over Cape Chidley to the extreme north of Newfoundland-Labrador. The Button Islands are seen in the far distance at the right. The absence of cirque-cutting is noticeable. Aug. 7, 1935 (275).

Kaumajet mountains; Fig. 91. The cause of the huge ice erosion has clearly been the hasty retreat of the cirque walls by glacial plucking. In consequence of the rich supply of stone material from the sides, among other things from scree incorporated in the ice and acting as a rasp on the valley sides and bottom, the cirques have moved both backwards and downwards; Figs 28 and 92.

Taking into consideration that terminal moraines are almost completely lacking in the valleys the morphological effect of the present glacierettes must perhaps have been restricted to a slight accentuation of the pre-Glacial cwms, which thus as a whole bear witness to a period of intense cirque excavation activity during the beginning of the glaciation (cf. p. 179). Already then the peaks and summits in the great mountain groups had been fretted by cirque-cutting in a startling way especially in the Torngak Mts, and transformed into a fantastic landscape of precipitous, narrow ridges and cols; Figs 25, 30, 74 and 95. It would be difficult to discover in any other place a more grandiose and symmetrical cwm than that great 'armchair' on the northern side of the Bishops' Mitre in the Kaumajet Mts; Figs 61 and 89 (200, 694, 275, 914). This magnificent cirque-valley is flanked by two spurs which terminate at an elevation of about one thousand feet in two 'sentinel towers' of black sediments reposing on five hundred feet of the light gray gneissic complex. About four miles to the westward of the cirque rises the highest summit in this region, 'Brave Mountain', about four thousand feet in elevation. The erosion of the local glaciers have transformed Nanuktut Island into an array of fantastic peaks and ridges, Fig. 93. In the high mountains along the stretch from the Kiglapait Mts to the Torngak Mts it seems, as mentioned earlier, that different generations of cwms and corries exist; they are in some places found in superposition. Perhaps they originated from different periods when the directions of the predominating winds in the winter were somewhat different; the youngest and most dominating cirque-glacierettes lie on the north-east side and have been accumulated by the south-west winds, while the predominating winter winds in our day are north-west. A close study of the behaviour of the cirques can therefore give important contributions for the understanding of the origin of the glaciation.

In some places the glacierettes have swollen into valley glaciers in a rather recent period and their erosion has formed trough-valleys, Fig. 95, which mostly finish at the upper end with a cwm.

In the greatly developed valley landscape in the Torngak Mts, the inland-ice mass became divided up into a number of currents in agreement with the

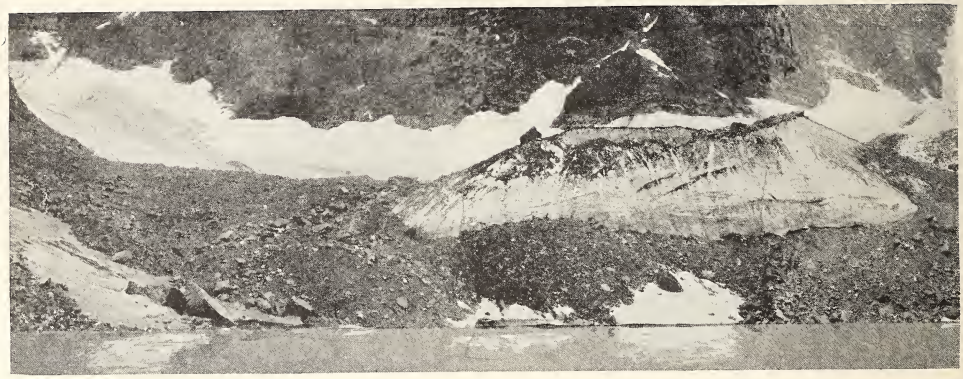


Fig. 98. The end of the glacierette, Bryant's Glacier in the Torngak Mts, in the summer of 1908 (275). Cf. Fig. 99.

topography of the rocky substratum. Partly because of their greater speed and partly because of their greater pressure on the valley floors over which the ice mass was thicker and heavier than on the neighbouring plateaus, these differential currents had a considerably increased wearing and splitting erosion power. Clearly these streams in the inland-ice cover greatly affected the initial forms of the pre-Glacial river valleys: they became both deeper and wider. The original V-shape of the transverse profiles of the river valleys became transformed into the U-shape of the glacial valleys: trough valleys arose; Fig. 96. In consequence of over-deepening processes the tributaries debouched with hanging ends in the main valley. One of the most conspicuous hanging valleys is two miles east of Kipsimarvik in Nachvak Fiord, showing a total discordance of twelve hundred and fifty feet in the altitude of the main and lateral valley floors; the fiord is five hundred feet deep opposite the lateral valley (200). On the valley bottoms themselves there also arose numerous depressions, cavities which in many cases are now filled with lakes and separated from each other by polished thresholds. In the northern river valleys, which became considerably remodelled by the inland-ice, e.g. Frazer River, Assiwaban River, etc., these depressions now appear as long, narrow flood-lakes between which there are rocky thresholds with the water dashing over them in foaming breakers; Fig. 72. High in the mountains where the landscape is not obscured by forest one will find the valleys floored over with a number of small lakes. In the drowned valleys the erosion had its effect far out on the submarine shelf.

The first glance at the map of Labrador reveals how extremely ragged and indented the coast is in plane, serrated by long, rather narrow bays running



Fig. 99. The end of Bryant's Glacier in the summer of 1931 (275). Cf. Fig. 98.

in tens of miles from the general coastline and splitting up into narrow branches in the interior. The bays are walled in by very precipitous cliffs, many of them two thousand feet high; Figs 101—103. The bottoms of all these bays have likewise by the overdeepening action of the inland-ice been divided into several deep, longitudinal basins, separated from each other by transverse thresholds. When then, at the end of the Ice Age, the sea rose and forced its way into the ice-worn valleys, after the remnants of the inland-ice had melted, they were transformed by ingression into f i o r d s.

Daly's investigations at Nachvak have fully proved that this bay conforms to a true fiord (Fig. 2 in 200) and is also one of the most typical. His soundings have shown that the greatest depth, of one hundred and ten fathoms, was found at a station six miles from the Narrows. Two miles to seaward of the Narrows the bottom shoals to an interrupted rock-sill which forms a long line of breakers athwart the bay entrance. The maximum depth obtained on the narrow bar running across the inlet was eighteen fathoms. A coincidence in location of sills with constrictions in the fiord was observed. The walls of the fiord, originally quite perpendicular from glacial over-deepening, are undergoing rapid destruction by the growth of abundant talus and the creeping and leaping of the glacial drift down the slopes. This material is set in movement especially by avalanches and rapidly filling the trench.

Among the other fiords, Komaktorvik, Kanglaksiorvik and Ryan's Bay are especially noticeable.

By this process, the Pliocene ria-coast of the Atlantic became transformed into a veritable f i o r d-c o a s t, and the Torngak coast into a grandiose f i o r d l a n d s c a p e. From the drowned cirques arose fiords of the specially broad, half-oval type known in Lofoten and some other coastal



Fig. 100. Looking south from over Mt Thoresby toward Nain which lies behind the right end of Rhodes Island, seven-eighths of an inch below top of picture at centre. Aug. 1932 (275).



Fig. 101. Looking south into the mouth of Ramah Bay, which disappears behind the sharply silhouetted cliff on the right. To the left of the centre is Little Ramah Bay (275).



Fig. 102. Looking south from 60° 28.5′ N and 64° 55′ W over the south-west corner of Killinek Island. Fox Harbour and Port Burwell are in the foreground just to the right of the centre. Beyond MacLelan Strait disappears among the mountains. The sharp twin peaks of Cape Kakkivik are seen against the horizon near the centre (275).



Fig. 103. Looking south-east over the southern entrance to Saglek Bay. Bluebell Island lies in the left foreground with Cape Uivuk just beyond. In the distance directly above the Cape is Watchman Island, and beyond in the far distance is Nanuktut Island with Cape Mugford to the right. Aug. 1932 (275).

districts in the extreme north-west of Norway. The long, deep Labrador fiords thus resemble those of Norway and Greenland in all respects.

Further south on the Labrador coast, on the other hand, the long but less deeply cut trough-valleys formed after the sea's inroads a transitional form between fiords and piedmont lakes. Such are Lake Melville and Double Mer, which lie in the same latitude. The character of these two reminds one of the fiords in the Sydvaranger-Murman coast and the piedmont lakes at the eastern foot of the Kjölen Mts in Scandinavia. These fiords are not topographically so prominent, the sides are less steep and less high, the depth much less, but in some cases considerable enough, as for instance in the narrow Grand Lake where 140 fath. (256 m) has been sounded. Sandwich Bay is to be considered as a very broad fiord-like bay communicating with the ocean by a wide, shallow inlet of which the entrance is only 6 m deep, and partly blocked by an island (482). The most prominent of this type of fiord is Hamilton Inlet-Lake Melville, running in from the ocean some 150 miles (cf. p. 134 sqq).

It is quite probable that the localization of the northern fiords has been primarily determined by fractures (cf. above), and to these zones of weakness the erosion of the running water and later on of the inland-ice became directed. This, however, it has not yet been possible to confirm. As to the large Lake Melville there is on the contrary no doubt (p. 154) that the outlines of this 'f i o r d-l a k e' have been predisposed by big rifts from which a graben originated, or more precisely a combination of different graben which have been modified by weathering and water and inland-ice erosion. This group of fiords, therefore, corresponds to the Finnmark type.

— It must be remembered that the process which in post-Glacial time gave rise to the vast boulder-fields on the summits (p. 183) has also originated the enormous masses of streaming scree-heaps and talus fans or small deltas which descend from the cliffs and clefts in the walls and which are nowadays to be found in nearly all glacially remodelled valleys. These residual masses have in many places much disfigured the original shapes as they were left by the inland-ice and especially scalloped the shores of the narrow river-lakes. The Tessiuyak has been dammed across by an alluvial fan, and a fresh-water lake, Tessersoak, three miles long, has been the result.

The wane of the inland-ice.

An advance in late-Glacial time of the small cirque-glacierettes in the Torngak Mts is a fact to which frontal moraines bear witness (p. 305). The advances were undoubtedly the result of small deteriorations, pulsations, in the climatic change to better conditions. The recession of the ice-edge was

controlled by the snowfall and by the temperature. Halts and re-advances must therefore be natural phenomena. They form, however, an exceptional and local phenomenon restricted principally to the high Torngak mountain more than some four thousand feet above sea level.

Local advances or halts of the edge of the inland-ice have also been noted in a few other places (see further on). Their stratigraphical position, as well as their importance as indicating general climatic changes, it is, however, not yet possible to decide; this matter must wait until the pollen samples collected during the expedition of 1939 have been analyzed. Nevertheless, we have something which can help us to a provisional interpretation of the development of the deglaciation process in Labrador in late-Glacial time, namely: the traces left by the glacial meltwaters, formed partly by streams flowing laterally and almost close to the edges of the inland-ice remains, and partly at the shores of the ice-dammed meltwater ponds. The distribution of both these kinds of formations will make it sufficiently clear that the supra-aquatic dissolution and disappearance of the inland-ice was due rather to vertical shrinkage than to frontal recession (precisely as in Fennoscandia: Tanner 1914, 1929, Enquist 1915, Mannerfelt 1940, and others).



Fig. 104. The International Grenfell Association's steamer *'Strathcona II'* in Seaplane Cove, Aug. 1931, the floating home of our expedition in 1939 (275).

In the interior of the country, at the beginning of the ablation period, the inland-ice was lowered by evaporation and the outflow of ice. The gradual thinning of the inland-ice must there have soon quickened, and the wastage of ice seems really to have exceeded its nourishment. The snow-line must consequently have been in Labrador, too, at so great an altitude already during the late-Glacial epoch, that the feeding of the remaining continental ice with additional solid precipitation decreased and perhaps finally ceased. Under these conditions, the inland-ice became gradually increasingly passive, it lost still more of its mobility. When because of the undernourishment the

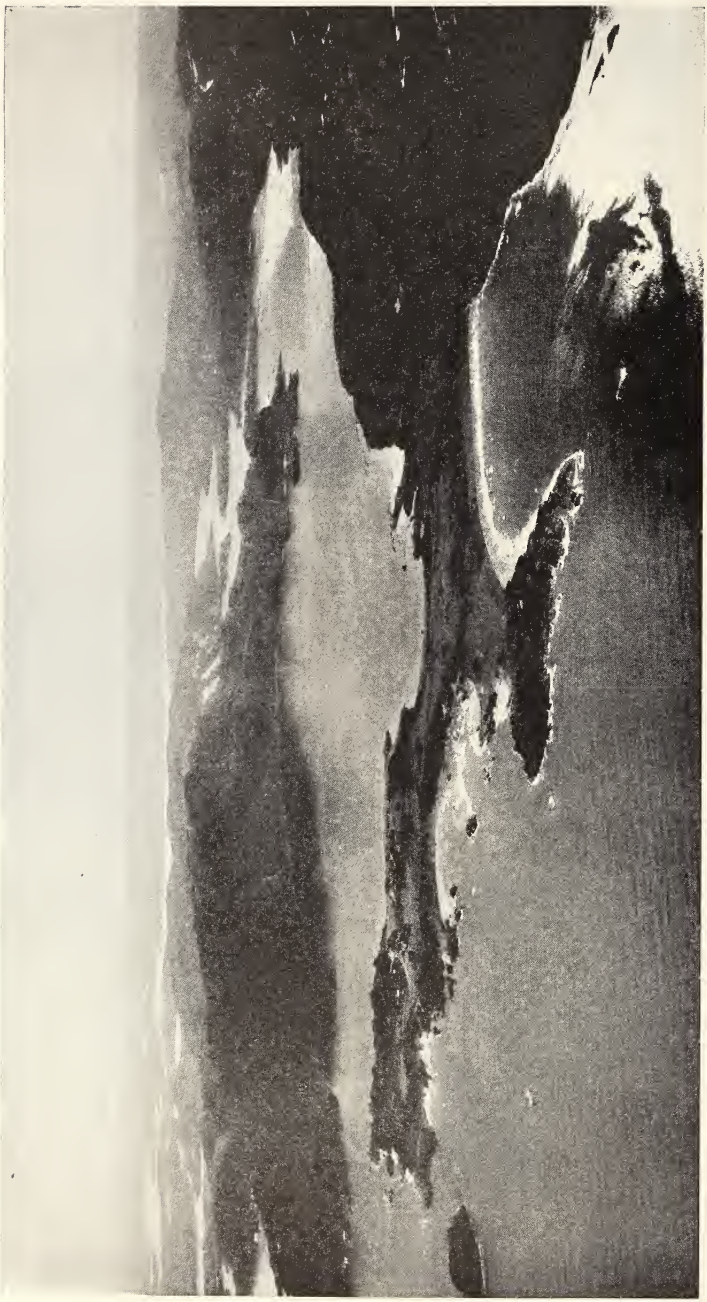


Fig. 105. Looking south-west over Port Manvers and the run leading to Webb's Bay, which is seen in the distance over Mt Thoresby in the middle of the picture somewhat to the left. Nain lies in the distance in the extreme left upper corner. Cf. Fig. 100. In the foreground lies the moraine ridge stretching from rock to rock. Aug. 1932 (275).

ablation increased, the summits of mountains became exposed. Finally parts of the ice-cover's eastern border became stagnant in the valleys of the rugged country: 'dead'. When this d e a d-i c e s t a g e had been reached the ground became uncovered by down-wastage to the valley floors, more or less rapidly according to the degree of the relief.

All observations go to prove that the mountains and watersheds had melted out at a stage when the neighbouring plains and valleys were still completely inundated by more or less dead ice-remnants. But, when great mountains and hills in the interior rose over the ice-blanket the absorption of heat increased in the uncovered ground and a gradually increasing part of it was transmitted to the adjacent ice. The ablation advanced thereafter even from the interior towards the border lands. Soon the ice was too thin to push supplies over the ridges towards the coast. The ice-mass was now split up into separated remnants which disintegrated *in situ*. A survey of the distribution of the meltwater masses over the peninsula will soon make this clear. (Cf. also ANTEVS: Journ. of Geology, Vol. XLVII, No 5, 1939.)

The heavy masses of meltwater which had suddenly arisen with the deglaciation gave rise to new landforms by erosion and accumulation and altered somewhat the primary surface forms left by the inland-ice as it withdrew.

I c e-d a m m e d p o n d s a n d s p i l l w a y s.

This is proved, for instance, by deposits in the George River valley. Here the high, sandy banks like the Thousand Island expanse reported by Mrs. HUBBARD (461 a), are composed of outwash material dropped in an ice pond dammed up from the north by the ice remnants which still lay in the lower, northern part of the valley, whereas the south, higher ground had became deglaciated. There are shore-lines towards the south-east, from Indian House Lake, observed by PRICHARD (761), who measured at a height of 700 feet above the present level of the lake a beach of clear gravel, repeated also elsewhere along the valley of the George River. HARDY suggested that the explanation of those shore formations might be the same as that given for the 'Parallel Roads of Glen Roy': they are shores of ice-barred lakes. The dissected delta found by WHEELER (1022) on the western side of the Indian House Lake bears witness to the shore of the pond described above but at a younger stage. The dead ice remnants had shrunk and its damming border receded more to the north, and the pond migrated then farther northwards and to a still lower level. At another later stage in this section are the wave-cut benches and the raised beaches in the Koroksuahk valley, almost at the level of the

pass at 750 feet above sea level; they indicate that the Koroksuakh brook was formerly the site of a lake that drained through the pass into Saglek Bay (1022). The ice-pond systems of the George River valley show that the margin of the last inland-ice remnants north of the watershed receded into Hudson Strait.

Another instance of these can be pointed out from the upper Komaktorvik valley. In the vicinity of Komaktorvik Lake, apart from an entrenched plain of ground moraine and outwash gravels, there are glacio-lacustrine deposits with many fine examples of kettle-holes (692). These formations do not seem to be kame-terraces (p. 214), and if that is so, they must indicate that the last



Fig. 106. An esker with wind-eroded crest projecting in the direction S 35° E towards the south-east into Birch Lake from its northern shore. The crest is partly coloured white by reindeer moss. Aerophoto the author, Aug. 1937.

dead inland-ice remains lay downward from them, very near the present mouth of this river valley. Separate ice remnants of this kind stayed in the valley perhaps long after the higher land had been uncovered; they were protected from melting and evaporation by melted-out morainic gravel or fluvioglacial matter deposited by meltwater streams flowing over the ice.

The magnificent 'dead-ice landscape', viz. hummocky accumulation of outwash drift deposited on disaggregating dead-ice remains on the western side of the Lake Plateau, Figs. 108 a and b, are proof that the mountains had withdrawn before the plain. If not, whence came the accumulating rivers, other than from the mountains towards the west! There are, however, other indications supporting this opinion.

At Mishikamau Lake a large body of water has been dammed up; Low reports that its highest elevated shores are 35 feet above the present level, and found in small coves; the islands, when lower than this altitude, are flat-topped and have evidently been levelled by water; when higher, the sides

are terraced at that elevation, and above it the surface is rolling. To the east a rise of 35 feet in the level of the lake would increase its area enormously; already the present level of the lake is practically that of the highest interior



a.

b.

Fig. 107. Esker ridge winding in a mean direction N 70° W in the Susan River valley at approximately long. 61° 50′ W. a. covered by reindeer lichen-rich, light spruce forest. b. the same after the vegetation had been destroyed by forest fire. Aerophoto the author, Aug. 5th, 1937.

plateau, and with so slight an increase as 35 feet its water would overflow on all sides under present conditions. A barrier of ice towards the south seems to be the explanation of the manner in which the lake attained its former level. There is also a lower beach of water-worn pebbles at about 20 feet (588).

At Birch Lake on the Ashuanipi branch of the Hamilton River there is an esker ridge on the south side of the outlet. This ridge is terraced into eight low steps, the highest 60 feet and the lowest 20 feet above the lowest water-level. Low supposed that only an ice dam would permit of an elevation of the lake sufficient to form such terraces.

At Menihek Lake further up this branch towards the head there is a persistent terrace 10 feet above the present level, another at 30 feet with others less continuous, one at 50 feet and a couple of intermediate ones. At the upper narrows of the lake there are three well-marked terraces at 30, 40, and 65 feet above the present level, having beaches of gravel. These shores indicate the existence of a large body of ice-barred water in the valley in late-Glacial time.

Shore lines marking the earlier positions of lakes (312, Fig. 1) partially drained since Pleistocene time are locally conspicuous features on the Wapussakatoo area. There terraces are to be found at approx. 100 feet above the present level of Lake Wabush Katsao. The terraces are not at a constant level, they lie higher in the side valleys.

Along the lake expansion of the Koksoak River about 20 miles below Lake Kaniapiskau there are similar terraces, the highest about 50 feet above the present level of the river and considerably above that of much of the surrounding country. Mention must also be made of a strong high level terrace visible, following Low, on the sides of the valley throughout practically the whole distance from Stillwater Lake to the mouth of Koksoak River; at the former place it is at about 620 feet above sea level but it gradually sinks to 300 feet above sea level at the latter.

There is thus no doubt that barring remnants of the inland-ice still covered the lower parts of the Hamilton River, the George River and the Koksoak River systems and probably all the other rivers when the head branches little by little became deglaciated. The remaining ice temporarily dammed large bodies of melt-water with very unstable levels in all the upper valley branches. The height of the water levels was determined by the capacity of the spillways, as successively lower outlets were uncovered. The most southerly of these ice-ponds probably spilled over thresholds in the southern watershed towards the Gulf. This assumption should explain the powerful marks of erosion in the valleys occupied today by rather small rivers of which the erosive power seems to have been in no reasonable proportion to the huge valley formation occurring in post-Glacial time.

Many other types of dammed melt-water may be found which have, for a time, left beaches or deltas. Above Moliak at Lake Melville is to be seen a very small hanging f l u v i o-g l a c i a l d e l t a, laid down perhaps in a little ice-



a.

b.

Fig. 108. Looking north-north-east over the 'dead-ice landscape' on the Lake Plateau between Gabbro Lake and Ashuanipi Lake. Note the fine slender esker in the middle of the picture a. Aerophoto the author, Aug. 2nd 1937.

dammed lateral pond on the south-western wall of the valley, leading from Double Mer to the Narrows. The delta's highest surface is of the outwash plain type and slopes gently from 97.2 m at its inner margin on the sur-

rounding rocks to 94.7 m at its outer border; cf. Fig. 109. Thence it slopes abruptly towards the north-east; in consequence of the undermining of the sea during late-Glacial and post-Glacial time, the distal parts of this delta have slid down so that nowadays only its apron part remains.

Enormous terraced delta deposits are to be found to the north of Webbs Bay toward the west from the entrance of Manvers Run, stretching some 5 km from west to east and 4 km deep towards the interior where the highest plateau surface is at 163.3 m above sea level. The configuration makes it evident that the deposition began in a narrow lateral pond which later became larger; the fluvio-glacial matter was partly deposited on ice-free ground,



Fig. 109. The delta above Moliak at 94.7—97.2 m above sea level deposited in a lateral ice-pond, and below it marine raised beaches up to 37.5 m above sea level. Aerophoto the author, July 1939.

partly on the barring ice itself and later sank together with it; cf. Figs 110 and 111.

Another similar enormous deposition of the delta-like type consisting of fluvio-glacial gravel masses laid down in a lateral ice-pond, is to be seen toward the west of the main inner track from Davis Inlet to Nain at the latitude of Zoar. These deposits reach from the seashore up to 90.2 m above sea level.

Conclusion.

By means of the distribution over the country of the deposits of the ice dammed lakes and ponds, together with the dry valley systems which once drained the melt-water to a great extent laterally, it will thus be possible to reconstruct the successive positions of the receding ice-edge. At the present stage of our knowledge we may, however, only mention that the formations in question indicate that the inland-ice withdrew from higher to lower levels all over the country, and the last remnants of the inland-ice remained in the lower middle parts of the great river valleys.

Land forms due to glacigenic accumulation.

The forms of morainic gravel.

Of the deposits left by the inland-ice on the bed-rock, the ground moraine, has the widest distribution. It is probable that practically all the ground of the peninsula became covered by the ground moraine when the inland-ice cover withdrew, but almost at the same time it was partially removed by secondary processes: melt-water erosion and solifluction and in the coastal districts the breakers at the ocean shore (see farther on).

From a petrographical point of view the morainic gravel of Newfoundland-Labrador is very polymict. This fact, taken together with the rounded forms of the rock debris involved, shows that the erratics here for the most part have travelled far in Newfoundland-Labrador. For this reason, after his observations on the Lake Plateau, the writer cannot accept Low's opinion according to which, in the centre of the peninsula, in which Low included the Lake Plateau, the moraine was composed of material which was mostly angular and had not come from a distance, and this in his mind indicated that the inland-ice started from this region and spread in different directions (cf. p. 175).

The ground moraine is smeared like a paste over the rock ground. The latter thus determines the mean topographical traits. The primary ground moraine surface in the interior is to some extent surging and characterized by numerous large, shallow depressions. The rocky outcrops are there few and the thickness of the cover is probably considerable. Such areas are usually poorly drained due partly to the damming up of the pre-Glacial stream valleys and partly to the inconsiderable slope of the land. This has contributed to the origin of the numerous lakes and hopelessly large bogs and swamps in the district between the 64° meridian and the western watershed.

In the morainic cover a tendency has been observed to knob-and-kettle or hummocky-drift forms in some few places. This kind of morainic gravel generally forms irregular heaps and curving stony ridges, separated by hollows and occurring in places where the crevasses and pits in dead-ice remains were filled up by morainic gravel and outwash products which had slipped down from the surface of the ice. These boulder-strewn, hummocky forms are to be found in valleys (Sandwich Bay). I discovered from the aeroplane a large complex of this kind of knob-and-kettle moraine right on the flat summit of the mountain toward the east by north and 2.5 miles from the trading-post at Rigolet. In these cases one may have to deal with ablation moraine, gravel which has emerged on the ice surface during the melting and evaporation of the ice.

Marginal moraines are rather rare, so far as has yet been observed.

At North West River two marginal moraines stretch out parallel over the river from Grand Lake; the outer one, 37 m high at the village, the inner at the river's outflow from Grand Lake is about 20 m high. It is said in the neighbourhood that these ridges continue far to the north away towards the Kipekak River. The aviators told me that at the moraines the landscape changes in appearance: while to the east bare rock surfaces are usual, to the west the morainic cover is fairly connected right through, in so far as it has not been

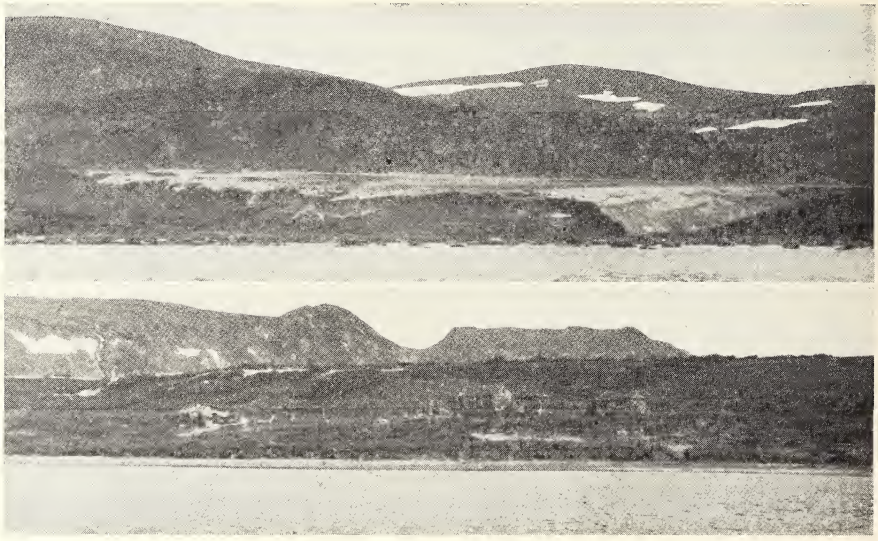


Fig. 110. a. The sandy fluvio-glacial deposits forming a lateral delta on the northern shore at Port Manvers. The top surface is at 66.6 m above sea level. b. Eskimo summer houses at the fishing place at Port Manvers. Photo the author, Aug. 1939.

locally carried away more or less completely by the enormous streams of melt-water in action at the end of the Ice Age.

A marginal moraine from an older stage of recession is to be found at Port Manvers north-east of the harbour; Fig. 105.

The most easterly bay of Lake Melville, Back Bay [Backway] has been separated from the ocean by a broad neck by marginal moraine which stretches thence along the coast in a south-east direction towards Cape Porcupine. — This deposit forms a key area for the Quaternary geology of the district, judging from my reconnaissance from the aeroplane; Fig. 117. Three separate times I later tried to get at the moraine from the sea, but each time in vain be-

cause of the swell of the ocean which hindered landing. However, it seems most probable that the level upper surface of the crest witnesses to deposition of fluvio-glacial material at the then level of the sea. The series of great shore lines descending stepwise on the slopes towards the sea witness to successive rising of the land. As there are small peat-bogs on each terrace, here is a unique opportunity to establish a direct connection between the rise of the land and the development of the climate and the flora.

Daly (200) reports a well-defined frontal moraine, some 50 feet in height,



Fig. 111. Looking south-east over the large fluvio-glacial gravel masses southward, beneath Webb's Hill in the Nain district. Picture taken from the highest ice-pond shore at 161.7 m above sea level; in the background Webb's Bay. Photo the author, July 26th 1939.

situated on the mainland opposite Copper Island, near Seal Island harbour. The flat-topped, bilobate curved ridge trends roughly north and south.

An apparently corresponding marginal moraine was found by the writer at the inner end of the fiord south of Hawkes Bay, right south of Squash Run, where it lies transversely across a valley. The level upper surface lies at 32.5 m.

The origin of the banks off the Atlantic coast (p. 156) is still a riddle. It seems not excluded that they can have some coincidence with the extension of the last inland-ice cover, perhaps being its frontal moraines.

Cooke remembered that between the two channels in the Gulf of St. Lawrence, the one tortuous extending along the Labrador shore for nearly 100 miles from Eskimo Bay on the north to Mecatma River where it turns south, and the

second wide and deep running along the western side of Newfoundland, there is an shallower channel about 50 miles in width. For 130 miles from the Straits of Belle Isle the average depth of water on this shoal is less than 50 fathoms. At the south end, opposite Cape Whittle, there is a similar shallow area about 15 miles in diameter. These two areas are separated by a gap about 45 miles wide over which the water is 50 to 70 fathoms in depth. The numerous soundings over the shoal indicate that its surface is extremely irregular with a relief of about 270 feet. There are many deep holes without apparent outlet in the irregular surface where the bottom is reported to be rocky or stony. These features all point to the conclusion, COOKE says, that the shoal is a great body of terminal moraine and certainly represents a long standstill of the inland-ice at this point and may mark the limit of the last ice sheet.

These few examples may indicate that the retreat of the inland-ice border was not continuous but interrupted by halts or perhaps slight advances. With the exception of those of North West River, the moraine ridges observed belong to the coastal region. No observations on marginal moraines from the interior are mentioned in the literature (cf. however LOW), nor have I been able to discover any notable ones during my flights. The logical conclusion at the present state of our knowledge is thus that after the edge of the inland-ice had receded from the Atlantic shore, the withdrawal of the ice-sheet continued, only interrupted at a stage when in the Lake Melville river system the ice border had receded to North West River.

The margin of the ice-cover has thus retreated both from the east and the west. As already pointed out the last ice remnants may have lain somewhere between the heads of the bays and the Lake Plateau in the district draining in our days into the Atlantic.

The forms of fluvio-Glacial origin.

The rapid melting of the waning inland-ice must have released enormous masses of water as can be concluded already from the rather ephemeral ice-barred lakes. The melt-water rivulets and brooks collected into mighty streams flowing along the general slope towards the ice-edge. These mighty ice-water rivers collected material from the ablation moraine on the surface of the ice margins and from the moraine in the crevasses penetrating the ice and began to roll and carry it down towards the local base levels. These streams rushed along partly in open canyon-valleys in the ice, partly along the crevasses, of which some were so deep that they reached the rock-ground. In places where dead-ice tongues remained in the valleys the fluvio-glacial streams flowed sub-aerially along their margins unless it was possible for them to

percolate crevasse-filled ice and disappear under it. The dead-ice belt near the ice-margins, perhaps ten to twenty miles wide, was more or less broken up and fretted asunder by water and air currents, and when the streaming water over-burdened with sediment arrived in this brittle zone it began to spread out its material and sink through the cavities and cracks into the ice and appeared in the front of the ice bulge as a stream of the braided type.

All along its course such a stream system tended to the graded profile: accumulation and erosion succeeded one another.

When the ice had receded, the rolled gravel deposits laid down by the fluvio-glacial rivers appeared in some characteristic shapes (cf. TANNER in Fennia 58, No 1, 1934). Out of the infra-marginal parts slightly curving, steep esker-ridges arose from the sediment deposited in the canyon-channels, whereas the esker-network and kame-fields came into existence from the deposits laid down over the rotten crevassed dead-ice. In the extra-marginal parts outwash-fields, pitted plains, fluvio-glacial deltas of gravel and sand were laid down by the heavily overburdened streams. Lumps of ice broke out from the rotten ice-margins, became mixed with the masses of sediment and in some places buried beneath the gravel, and after they had melted pit-holes and large trenches arose in their places. Where the laterally flowing melt-water deposited sediments in the cavity between the slope of the ice and the slope of the valley side following the principle of the graded profile kame terraces were formed, which downwards in the valley passed over as valley-trains and river terraces.

The most puzzling formations have in this way originated in many places. The most complicated forms are to be found in the combinations of the hummocky drift with fluvio-glacial deposits forming the so-called dead-ice landscapes; Figs 108 a and b.

As yet here has been no systematic research into the fluvio-glacial deposits of Newfoundland-Labrador. Only occasionally has the writer discovered such in nature or in the literature; see especially in LOWS report (588).

Splendid, slender esker ridges with the crests eroded by the wind, and esker networks, all covered with thick beds of reindeer lichen and succeeding one another are to be seen from the aeroplane especially on the Lake Plateau. For instance at Birch Lake the esker creeps like a giant serpent in the direction N 30°—35° W; Fig. 106. Towards the south-west from Menihek Lake an esker ridge has the same trend (cf. other places in LOW). Beautiful eskers along the uppermost stretches of the Hamilton River system extend

south and north, generally following the valleys; some of them can be traced for as much as 40—50 miles (312). About the same trend is taken by an esker south of Lake Mishikamau. The direction of an enormous esker in the upper part of the Susan River Valley is about N 70° W; Fig. 107.

In the direction south-east about 4.6 km from Rigolet an imposing esker ridge of the kind we generally designate a p l a t e a u-e s k e r in Fenno-scandia (cf. TANNER, loc. cit.) rises abruptly up to about 75 m out of a bog at 35 m above sea level. The top surface is pitted with hollows and great ditches, but is on the average surprisingly plane rising gently to 93 m in two kilometers. It then continues to the south-south-east as far as my eyes could follow it, at least four kilometres. Its form is that of the typical, supra-aquatically deposited esker, formed by the filling with fluvio-glacial material of a canal reaching to the bottom of the dead inland-ice. Also here the top surface still shows the impress of erosion by the fluvio-glacial stream which has flowed toward the north-east and which began to run dry before the surrounding ice had sunk to the top surface of the esker. This explains why the main ridge is so connected and why no parasitic ridges stick out from its sides. Cf. Fig. 167.

Deposits of fluvio-glacial material to be best classified as degradated k a m e-t e r r a c e s occur on the southern shore of the Backway high up on the slope descending gently towards the east (cf. KINDLE's map in 523), and these show that the last inland-ice remnants were situated still farther towards the west. For further particulars regarding the Lake Melville area cf. KINDLE's report.

According to PRICHARD, George River flows on a sandy bed at the upper end of Indian House Lake and the photographs I have seen give the impression that the lake on the west side is bounded by an esker landscape. Mrs. HUBBARD speaks of gravel shelves opposite Pyramid Mts on which there are serpent-like sandy ridges. Her description gives the impression that the valley immediately below Indian House Lake is filled by an esker landscape.

On the upland plateau between George River and the sources of Fraser River, PRICHARD (761) found sand ridges which seem to be eskers of the same type as in Lapland arise from the fluvio-glacial filling of the fissures in dead ice.

T h e d e s t r u c t i v e i n f l u e n c e s o f t h e g l a c i g e n i c m e l t-w a t e r a n d s o l i f l u c t i o n o n t h e l a n d f o r m s.

The decay of the glacigenous forms began as early as in late-Glacial time and has continued ever since. It was, however, concomitant with the vanishing

of the inland-ice that the most effective destruction of the constructional forms took place.

A very conspicuous phenomenon in Labrador is the infinite number of colossal erratic boulders spread out almost without order (434). These are to be seen scattered nearly everywhere on the mountain summits and the hillsides, and the beds of the river are full of them and the water flows turbulently between. They are to some extent also found scattered all over the morainic cover on the lower land, to some extent forming small ridges or piles, or isolated small heaps in all kinds of positions on the rocky surfaces. Many of these boulder heaps seem to have been deposited very gently in their present somewhat unstable positions as the ice melted away. Such are the rocking-stones which appear very easy to dislodge; these erratics have probably been laid down as an ablation moraine, but this explanation does not hold good everywhere. — The presence of such labile blocks shows, as BELL remarks, that in their neighbourhood no severe earthquake shocks have occurred since the Ice Age.

A closer examination of the distribution of the boulders will show that the disorder is only apparent, for they are often arranged in curving rows which wind along the mountain slopes at nearly right angles to the lines of greatest slope. The rows of blocks therefore give rise to the assumption that heavy currents of melt-water from the inland-ice must have been formed and flowed laterally downward along the ice edge which at that time lay obliquely over the mountain slope. These currents washed out in their beds the less coarse material from the morainic cover so that only the heavier boulder heaps remained in the temporary river beds. During the down-wastage of the inland-ice the river bank, which was the ice remnant, melted away and a unilateral river valley appeared which can well be called a s t r e a m t e r r a c e. On smooth mountain slopes they form series with up to fifty sub-parallel terraces. Cf. Fig. 119.

Such oblique s t r e a m t e r r a c e s and e r o s i o n z o n e s occupy many hillsides, which in places have become wholly bare from top to foot; in some erosion zones all loose material has been washed away from the surfaces and ravines except the largest boulders, revealing today only locally a crevassed rocky surface, the ruggedness of which it is not easy to exaggerate. — This phenomenon and the forest fires are in general the reason why so many who have carefully sought glacial striae in the interior of the peninsula have found none. — The writer remembers especially two large areas of this kind: the mountainous land between the Beaver River and the Hamilton River towards the east from Grand Falls, and the wide barren mountain stretching

into Canada towards the north-west from the Petitsikapau Lake; Fig. 181. But naturally there are also erosion zones on the smaller mountain- and hillsides. Completely bare rock surfaces are especially numerous in the outer coastal district, and the aviators I consulted stated that they were specially abundant to the east and south-east of North West River. In many places the formation of these bare rock surfaces is nevertheless camouflaged by the great boulder fields split up by frost in post-Glacial time. Enormous masses of them formed on the bare rock surfaces of the mountains and hills of Labrador are due to climatic reasons: the air is very clear, and radiation of heat is therefore great and the difference between night and day temperature on the rock surfaces is very considerable, the water in the fissures and cracks freezes and thaws repeatedly. These frost-riven masses show how surprisingly great the frost-splitting was after the Ice Age, especially in the northern mountains.

In many places the boulders, perched singly or in groups, on the tops and sides of the hills and mountain crests may however have another origin. I think they may have remained on those barren surfaces when the finer constituents of the loose cover were carried away by the extremely strong solifluction so characteristic for the country. For this reason the morainic cover is surprisingly scanty in the northern coastal districts; evidently the slow moving of the soil has relieved the hillsides of their mantle of gravel which has then been transported into the valleys and still farther down by the rivers. Where melt-water erosion and solifluction have collaborated the mountain sides are almost completely bare. The bleak, barren, rocky coast in the south of Labrador, with its bare rock ledges, is strikingly reminiscent of the northern oceanic borderland of Fennoscandia; Figs. 14, 15 and 161.

The degradation by solifluction is completed by the slidings which are still proceeding. A portion of the drift cover becomes water-soaked and heavy when the frost is melting and detached from the hillside it rolls down and carries trees and stones along in an irresistible rush to the valley or lake shores below, there lying matted together over roots, rocks, and broken limbs in inextricable disarray. It seems scarcely possible that landslides should occur in the dryness of this rather continental climate at some distance from the seaboard. Meanwhile parallel, narrow, fresh stripes of bare rock running down the mountain slopes not only at Hamilton Inlet but also in the surroundings of the inner Lake Melville, prove that the process is active there too; Fig. 125. Hind also reports from the Moisie River valley narrow stripes on the hillsides exposed by a landslide.

The confusion of the pre-Glacial drainage pattern due to the erosion and the accumulation of the inland-ice.

The great pre-Glacial land forms were only slightly modified by the erosion of the inland-ice. Yet, in some places glacial erosion seem to have caused a reversal of the direction of streams by lowering the divides between different river systems. It seems probable for instance that the upper section of the Eclipse River in the Torngak Mts had its outlet in pre-Glacial time to Ungava Bay, and not until the divide towards the Atlantic was lowered, evidently by glacial scourage, did it become a tributary of the lower section of the present Eclipse River flowing into the Atlantic.

On the other hand, the depositions of morainic and fluvio-glacial gravel had a great effect on the pre-Glacial topography and especially profoundly on the drainage systems. Glaciation, I suppose, took place repeatedly and disorganized the earlier drainage still more by filling up the Tertiary valleys with drift which is still not completely removed. By the distortion of the graded profiles of the pre-Glacial water courses by drift deposition or by deposition of boulder accumulations washed out from the morainic gravel in the channels, rapids and falls arose in places were such had probably not existed before the Ice Age. Some of the Pliocene channels, after having been locally filled up with glacigene deposits, were in many localities so much obstructed that the water-courses were compelled to establish new surface-drainage courses. This is obvious especially at the Lake Plateau and in other regions where the pre-Glacial topography is distinguished by very modest relative differences in altitude. On the other hand, in the mountains and regions with rugged topography, the confusions in the drainage systems were on the whole not so considerable; indeed the post-Glacial streams only cut new valleys in the glacigenous accumulations which had buried the Tertiary valleys. In places, however, these superimposed valleys run over ledges that were formerly parts of the old valley walls.

The confusion in the drainage systems is strikingly expressed by the forms and divisions of the lakes. The drainage collects in a jumble of lakes that spill from one to another through chance depressions of the surface.

It has already been indicated that after the clearing out of the pre-Glacial fissure-valley topography and the great flat depressions in the rock ground, collections of water began to take their place. Lakes are therefore very thickly scattered over the whole Labrador peninsula as is the case over the glaciated North American area in general. In Newfoundland-Labrador there is, however, a surprising absence of very large bodies of fresh water such as are to be

found on the western side of Hudson Bay. The largest are Mishikamau Lake at about 1500 feet above sea level, found by Low and Eaton to measure 55 miles from north-west to south-east, but if some long bays are also reckoned, its total length may be 75 miles and the greatest width exceed 20 miles. Another large lake, at least 40 miles long, is the Minipi (not on the maps; cf. Fig. 156), towards the south from the Hamilton River. Grand Lake is also 40 miles long. It is a matter of taste whether one calls Lake Melville (= Groswater Lake, or in the Indians' language Winnipeg) a 90 miles long lake or a fiord lake; its water is salt (1114).

Added to these there are numberless small lakes collected into certain districts in the interior and forming a labyrinth with islands, channels and bays to such a degree that they increase the complication of the topography. Many such tracts are still complete mysteries even for trappers (Osakmanuan Lake and Astray Lake). The general cause of this wealth of lakes here is chiefly the slight slope of the regenerated sub-Palaeozoic land surface (p. 166). But as has already been stated most of the channel and lakes are surrounded not by rocky shores but by greatly scalloped moraine gravel shores, and the moraine gravel forms numerous low islands and stony shoals in them. Such lakes have arisen when the depressions in the moraine gravel surface were filled by water. Many smaller collections of water of this kind have certainly been already wiped out by the formation of peat-deposits and in that way the number of lakes has been decreased. The drainage system, however, shows clearly this method of formation, because the lakes spill their water from one depression to another through channels that wind capriciously like the lakes.

Still, in many places the wealth of lakes is in no way less than that of the unequalled lake plateau of central Finland; the percentage of the water area can be estimated in many places at more than 30; cf. Fig. 18. For this reason I have, in the area richest in lakes, called it Labrador's Lake Plateau, and in this way indicated a tract lying between 550 and 625 m above sea level, and stretching from the Atlantic watershed in the north-west, west and south to the approximate eastern boundary formed by meridian 63° 30′; if the vegetation were not so different, one could believe one was in Finland. e.g. in the central part of the Petsamo area. Later I discovered that already in the 1860's Hind spoke of the 'Lake Country'. The lakes on the northern watershed of Ungava are not of very great size, but on the plateau or dividing plain the proportion of water to land is about equal (434).

In agreement with this there arose all over the country by the deposition of glacigenous sediments a great many new rivers of all sizes. In straggling,

irregular channels these zig-zag not far below the general level of the surrounding country, separated by secondary and tertiary divides which are partly indefinable. In some water systems bifurcations arose. Other rivers ran off from their gravel-filled pre-Glacial valleys and were linked into new channels.

Mishikamau Lake deserves mention among the bifurcations; in the spring it runs both into George River and Naskaupee river (644). Osokmanuan, or Unknown Lake (105), runs both into Gabbro Lake and through Unknown River towards the Hamilton River. According to the Indians, Clare Lake has no less than three outflows. This labile drainage shows how fresh the surface forms and the post-Glacial hydrography on the Lake Plateau are; the rivers have not yet had sufficient time there to rectify their direction and much less to excavate distinct valleys.

We shall here give only one example of a river diversion, but at the same time the most imposing, it is to be found in the upper part of the Hamilton River, at Grand Falls. As already mentioned this river flows in a deep, well-defined pre-Glacial valley downwards from Grand Falls, while above them no valley in the ordinary sense of the term is recognizable. Grand Falls forms thus a remarkable physiographic limit. The physiography of the surrounding country enables us to imagine quite well the development which led to the present state. The Grand Falls, moreover, being one of the grandest spectacles of not only Labrador but the whole of North America, they deserve to be described a little more in detail (Cf. 105, 138, 139, 287, 290, 291, 594, 837, 1000, 1093, 1110).

Slowly and calmly the Hamilton River flows along through the labyrinth of lakes down to Sandgirt Lake, Flour Lake and finally Jacopie Lake at about 550 m above sea level. After issuing from this last, the river continues to flow comparatively calmly till about four miles from the neck of Grand Falls. One mile before it takes its leap the river is still a noble stream, 400 yds wide, but already accelerating in speed. Suddenly the water begins to rush along in a strong current with plumes of spray and reaches the threshold of the fall above Grand Falls in four small cataracts (pictures in 105). Reaching this point, the entire column of fleecy water is compressed within rocky banks not more than 50 yds apart; Fig. 75. At the grand leap the heavy mass of water plunges with a deafening roar over the northern wall of the Bowdoin Canyon quite vertically from the dizzy height of 316 feet (BRYANT's measure, KENASTON measured 348 feet, LOW 302 feet) into the pool below. The terrific force of this wild drop causes a tumultuous greenish cupola of spray to swell up turgidly from the pool, reaching a height of nearly 30 m. This foaming cupola is surrounded by a world of exquisitely coloured mist and mighty reverberations. Clouds of spray and numerous rainbows span the water.

Grand Falls is one of the greatest waterfalls in the world, nearly twice as high as Niagara, but it is also one of its scenic wonders, said BRYANT. The grand leap in Grand Falls is one of the most magnificent natural phenomena the author himself has ever seen during his roving life; one actually shrinks when confronted with the wondrous grandeur as the down-rushing white-green water mass suddenly breaks through from the dark green sea of forest. Conversation becomes a difficult matter, one is simply lost in admiration. One has the feeling that the solid rock shakes under one's feet. The thunder drowns the noise of the aeroplane.

A dense cloud of mist hangs over the falls and is to be seen 9 miles away in clear weather, the roar can be heard for 20 miles. The trappers say that one ought to see the falls on a calm winter afternoon. Then a great column of mist a mile and a half high arises from the leap like smoke vertically against the sky as if joining earth to heaven. Then when the sun sinks in the evening, and its last rays are broken in the pillar of mist, it is said that here arises the wildest and boldest play of colour that can be seen; so say the trappers. When one sees this it is possible to understand the horror of the natives for this uncontrolled discharge of the forces of Nature: BRYANT says that he vainly tried to get his Indian boatmen to go with him to the Falls. In the Indian language the Grand Falls have several names expressing a descriptive quality but very prosaic; some call it *Pitshe'tonau* [it steams], others *Pat'ses'cae'wen* [the narrow place where the water falls] but they all avoid the falls!

From the big leap the maddened water continues its turbulent career in the deep Bowdoin Canyon, it too being extremely remarkable. The boiling torrent is here shut in between perpendicular cliffs of pinkish, gneiss-granite, 100—150 m in height, and continues between them, slightly zig-zagging, for more than 8 miles, the spray spurts over the falls and the mist spreads over the watcher, cold as the hand of death (cf. SCOTT's map in 837); Fig. 76. The total descent in 5 miles is said to be 760 feet, in 9 miles 900 feet. Thus even below the grand leap the river has a very strong rapid called the B r y a n t R a p i d, which does not freeze in winter. This canyon debouches into the pre-Glacial Hamilton River Valley.

The behaviour of the water-course is here seemingly paradoxical. The river falls in over the perpendicular northern wall in the Bowdoin Canyon, which in its turn debouches at right angles into the pre-Glacial valley of the Hamilton River Canyon. From the junction of these canyons the Hamilton River valley continues rather considerable, 0.5 to 0.25 miles wide under the name of Valley River valley straight in its former direction west-to-north towards the Lake Plateau. This latter valley is now filled with terrassed drifts (cf. SCOTT's map in 837 and LOW's descriptions 588 and 594, 105). It seems evident that Valley River is the upper part of the Hamilton River before glacial diversion, and it began probably at the Osakmanuan L. (287). About 20 miles from its junction with the Hamilton River and about 25 miles south of Grand

Falls there is another big waterfall, the Unknown Twin Falls, also known as the Grenfell Falls (935).

There is little doubt that the Bowdoin Canyon, Fig. 76 (cf. Figs in 105), is an unfinished erosion valley, and that previous to the Ice Age it was the valley of a stream much smaller than the present one. The zig-zag outline of the canyon may indicate that in pre-Glacial time a stream slowly fought its way backward in a fractured zone in the bedrock, excavating it by cavitation erosion, metre by metre at a rate of perhaps some metres in a century. We have only a dim idea of the length of the erosion phase. There is still no evi-



Fig. 112. The *Balanus-balanoides*-limit indicated by a white horizontal belt formed by the small cirripeda on the boulders and rocks at Webb's Bay. The upper limit of this belt has been used by the author as zero point in measuring altitudes. Photo the author, Aug. 1939.

dence that the valley has been cut back or otherwise eroded since the Ice Age, except the removal of the moraine gravel which then filled it nearly to the top, as patches of moraine still remain on the inner sides of the sharp bends. It is thus certain that post-Glacial time was too short for such a work, and the canyon is undoubtedly a pre-Glacial form. When during the Ice Age the valley of the Valley River — or perhaps the valley of the Unknown River, if it was the one which drained the Lake Plateau to the Hamilton River canyon — was obstructed by glacial accumulations, the water was compelled to find a new outlet and then spilled over from Jacopie Lake through the lowest sill of the new watershed. It then found the buried Bowdoin Canyon

from which it began to clear out the glacigenic deposits, and this canyon became the new outlet of the enormous masses of water; cf. Fig. 74.

The Grand Falls were discovered by McLEAN as early as 1839 and he later gave a splendid description of them. In 1840 he made use of the portage here — Big Hill Portage — on his journey from Fort Chimo over Mishikamau Lake to Hamilton Inlet. But because of their inaccessibility and the wildness of the country, the Falls were only much later better known after the journeys of LOW (588, 594), CARY (138, 139) and COLE, BRYANT (105) and KENASTON,



Fig. 113. The rock-bench (in the background) formed by alternating wave-cutting and freezing at the present seashore south of Kaumajet Mts some two km west from Mugford Tickle. Photo the author, July 1937.

THOMAS (935), FRISSELL (287—291), WATKINS (1000) and SCOTT (837). It is astonishing that only very recently have plans been made to exploit their titanic cumulative energy. Estimates of the utilizable hydraulic power obtainable here vary from 1) the Grand Leap with a fall of 101 m — from 1,600,000 to 1,500,000 HP. 2) The whole rapid with a fall of 245 m — from 3,850,000 to 2,750,000 HP. (261, 919).

Although the local details of the drainage reflect the vagaries of glacial depositions and glacial erosion, the deeply entrenched and structurally adjusted character of the main valleys, many of which run transverse to the direction

of ice movement, makes it clear that the broader features of the drainage system originated long before the Pleistocene. The existence of abundant glacial drift even in the main valleys shows conclusively that the erosion since the disappearance of the last ice sheet has been slight (312).

Changes of level in Labrador in late-Quaternary time.

Volumes have been written on this subject, as it concerns the north-eastern part of North America, and various explorers have collected a notable amount of data relating also to Labrador (cf. for instance 54, 202, 204 a, 246, 247, 292, 519 a, 524, 967 b, and 1106). Finally, Cooke (174) endeavoured to gather the scattered notes and present them as a whole, in the hope that later workers might be more easily able to add new information and to correct the inaccuracies and deficiencies of the old. Here I shall give a preliminary review of this subject, adding some of my own observations, which will be later systematically worked out and published.

The position of the land before the onset of the glaciation.

The continental shelf fringing the peninsula gives, at first glance, the impression of a giant beach; cf. Fig. 129. Unfortunately little is known about its morphological character in Labrador.

Close studies off the coast of United States have on the other hand given more reliable information. The flat surface of the continental shelf shows predominating characteristic beach forms resulting from marine erosion or heavily modified fluviatile forms, and beyond the shelf the steep continental slope is thoroughly dissected and shows none of the characteristic forms resulting from sea action but those commonly produced by subaerial erosion.

The history of the shelf seems, from the physiographic evidence, to be one of alternate marine planation and emergence during the periods of lower sea level. It has been concluded that the shelf is composed by coastal plain beds laid down on a post-Tertiary, seaward dipping peneplain (979 a, 895 a, 244 a, 244 b). It is belived that the major canyons are not necessarily of fairly recent origin, but that the dissection was in action probably throughout most of the older stages of the Pleistocene. The shallow partly preserved channels of the shelf were cut during late-Wisconsin glaciation (862 a).

These results give us some valuable hints on the question, but are not directly applicable to Labrador because of the subsidence of the coast of the United States whereas Labrador is rising. The evidence must be found in Labrador itself.



Fig. 114. Island near Hamilton Inlet showing conspicuous raised beach (265).

It has been shown by different investigators that all the coasts of the Labrador peninsula show evidence of drowning. On the sea bottom in the coastal waters drainage patterns are to be found very similar to the subaërial river systems with branching river valleys, and it is difficult to account for these submarine valleys by any hypothesis other than that they represent valleys dug out by streams at a time when the bottom of the present submerged area where the submarine valleys are found was above the sea level.

By a captivating analysis of the undersea topography of the Hudson Bay area, using information from KINDLE (521), TYRREL (970), JOHNSTON (504 a) and WILLIAMS (1033 b), COOKE (174) arrived at the conclusion that the subsidence of the pre-Glacial relief can be estimated there at 600 to 700 feet.

Also the Hudson Strait region exhibits following BELL (55) much evidence of being still considerably below its pre-Glacial level; COOKE estimates the drowning to have been 400 feet or more.

Off the Atlantic coast both the deep, narrow fiord valleys and the fringe comprizing a wide belt of islands, the skerry-guard, from 10 to 25 miles wide, give at first glance the impression that the rough, mountainous country has been partly submerged. KINDLE (523) thought he had found a whole river system at the bottom of Hamilton Inlet, of which the branches at one time combined to form a single stream with its mouth somewhere east of Stag Island. If there were a further coastal elevation of 200 feet or more, he stated, the mouth of the Hamilton River would again approximate to its pre-Glacial location. COLEMAN (157) was also inclined toward a similar opinion. In the Nachvak Bay the cliffs rise from fairly deep water, any talus being below the sea. The fjord runs in all directions, but with east and north-east faces the most common, and it was considered to be a pre-glacially carved river valley, because it gives no suggestion of any great and continuous line of faulting, and the direction does not correspond with any known structural feature of the rocks themselves. Also DALY (200) observed at once that the coastal fringe suggests that the coast has been drowned by rather recent subsidence. However, he called attention to the possibility of erosion below sea level by the inland-ice: the differential erosion of an ice sheet extending out beyond the island zone may have excavated crypto-depressions which remained when the inland-ice had left the country. ODELL (692) too considers that the coastal region in Tertiary time was uplifted to an elevation probably far in excess of the height of the present mountains. COOKE stated that the lines of evidence indicate that the land surface was, originally, at least 300 feet higher than at present. The writer is of the same opinion.

As to the drowning of the bottom relief of the Gulf of St. Lawrence there can, moreover, be no doubt. By his studies (also using the results of previous research work) COOKE seems to have proved the sub-aerial origin of some prominent bottom features of the St. Lawrence Gulf. Through it passes a submerged valley eroded by the pre-Glacial St. Lawrence River, extending from the mouth of the river proper south of Anticosti Island, through Cabot Strait and the banks off the coast of Newfoundland and Nova Scotia, out into the deep sea, thus separ-

ating the banks between Cape Ray and Cape Breton. A whole series of drowned, subsidiary, river-carved valleys, with a fairly uniform seaward slope, runs in the mean trunk-valley, called by SPENCER the 'L a u r e n t i a n R i v e r'.

This river system has of course been somewhat transformed by glacial erosion shown by the hanging valleys of the tributaries and the shallow sills of rock and drift at the mouths of both the main and the subsidiary valleys and the holes without outlet, and the accumulation of silt from the present rivers and tide-currents; perhaps also local downfaulting has changed the primary shape. No absolutely definite conclusion as to the rate at which the sub-aerial relief was drowned is possible as yet because of the scanty evidence at present available. Two terraces at depths of 36 and 50 fathoms on the western side of the submerged channel bordering the west coast of Cape Breton and minor terraces at different levels on its opposite side seemed to JOHNSON (502 a) to represent the sub-aerially terraced walls of a valley now deeply drowned. COOKE thinks that the depths of the tributary valleys at their junction with the main valley probably represent fairly closely the depths of the latter before overdeepening took place. Such a conclusion requires that the region of the St. Lawrence should in pre-Glacial times have been a little more than 600 feet above its present level.

The general conclusion might be drawn that at the end of Tertiary time (see farther on) the Labrador peninsula was higher above sea level than today, perhaps something between 300 and 700 feet higher.

Considering that the post-Glacial erosion was rather inconsiderable in amount in these regions, we are bound to conclude that the features of the drowned topography are pre-Glacial (cf. 174). On the other hand, they cannot be very old, because in that case the depressions would have been filled by sediments and the slopes flared out (cf. GEORGE ROSS).

Now a possibility has been found to determine the age when the drowned Laurentian River system was in action. It has already been stated that it cuts through the submarine platforms constituting the banks off Newfoundland and Nova Scotia. Pieces of rock brought up from the banks contained marine fossils judged to be of late Miocene or early Pliocene age (980, 977 a). As these rocks must be considered of local origin, the rocks of the bank must also be Miocene or later, and the age of the Laurentian River system must be still more youthful since the banks were land area in late Tertiary time (174).

The drowning of the land-block.

We have then concluded that at the end of Tertiary time the land was at least 300 feet higher than at present, and not until glaciation began to develop was the subaerial relief drowned for the first time after the Silurian Age, as far

as is yet known. This was probably owing to the weight of the inland-ice which forced its basal area to sink below sea level. Since the last glaciation the land has not had time to rise to its pre-Glacial position. The conclusion formed from a physiographic point of view regarding the epoch when the subaerial moulding of the mountainous relief in the Torngak Mts was at work (p. 161 sq.) is precisely the same as that arrived at from the palaeontological evidence.

It is extremely difficult to estimate the exact amount of the present drowning of the pre-Glacial land surface. If the figures observed for uplift



Fig. 115. Raised beaches three miles west from the southern end of Mugford Tickle. The highest shore is at 68.3 m above sea level. Photo the author, Aug. 1939.

(see map 4 in 174) be added to those of drowning (see above), a provisional estimate of the total depression during the last glaciation would be some 1,200 to 1,500 feet along the eastern coast of Hudson Bay, 500 to 800 feet along the Atlantic coast, and 1,000 to 1,200 feet along the shore of the Gulf of St. Lawrence. However, the recorded depression may not be the real depression, for the areas within the ice border may have been considerably elevated before the ice melted from this area and the sea had access to them and could leave any record (Tanner 1905, 174).

The upheaval of land after the last glaciation.

It has long been known that there are on Labrador at varying altitudes above the sea level biogenetic deposits of marine origin, uplifted delta formations with wave-cut terraces with vertical cliffs and far in the interior raised beaches and wave-built terraces, sea caves and stacks, etc.; Figs. 114, 115, 116, 118, 122, 124 a. McLEAN (610, 611) stated already in 1849 that along certain parts of the east coast of Labrador rows of boulders are to be seen lying in



Fig. 116. Raised-beaches on the northern shore of Lake Melville north-north-west from Greene Island. Aerophoto the author, July 1939.

horizontal lines, the lower about 200 yds from the high water mark, while the most distant lie near the crest of the adjacent hills. HIND (434) reported ancient well-defined beaches which rise far above the highest tide and water-worn rocks like pillars that front the sea near Mingan. PACKARD (716) found in an uplifted sea bottom forming the present beach at Hopedale stones and pebbles covered with nullipores and polyzoe; the *Mya truncata* still remained perpendicular in their holes, and the most delicate shells were found with their epidermis still unbroken and their valves often united by the ligament. This state of things

shows that the deposit rose slowly and almost imperceptibly, PACKARD concluded. In Indian Harbour he found an ancient beach at 200 feet above the sea; the shingly surface was free of vegetation and it looked as though the waves had receded from it only the night before. Between Belle Isle and Hopedale he noticed raised beaches in many places; in his opinion they form about 12 terrace-levels ranging up to 500 feet, but most of them are under 200 feet. BELL estimated the height of a raised beach at Nachvak Inlet to be about 1,500 feet above sea level. The most complete series of raised beaches and terraces has been recorded by DALY (200). There are also contributions by COLEMAN and KINDLE. In a valuable study (174) by COOKE in 1930 the then available observation material is collected.

These uplifted shore-formations thus show that Labrador formerly lay deeper in relation to the surface of the sea than today and that the peninsula later slowly rose. The interpretation at present generally accepted of the occurrence of these upwarped shores and the phenomenon of land-rising in general is presented in a simplified form as follows:

The modern principles upon which the interpretation of the phenomena of the changes in level is based.

Experience has taught us that the earth's crust all over the globe is in a condition of labile equilibrium. If it is loaded in one part by the deposition of more considerable masses of sediment the equilibrium is disturbed and the earth's crust there begins to sink slowly. The sinking continues until the downward pressure of the added burden is neutralized by the upward pressure of the masses which by the sinking were displaced at a very great depth (TANNER 1929, 204 a). When later erosion gradually carries the sediment away the load is reduced, the state of balance established through the sinking is disturbed in its turn and the pressure directed upwards now gains on the downward pressure and under its impulse the earth's crust begins slowly to rise again, endeavouring to gain a new position of equilibrium with the surrounding areas. From a geological point of view, however, the earth's crust can scarcely attain a stable equilibrium until a new factor of disturbance interferes with the balance system. This phenomenon, the so-called isostatic adjustment, is thus more an effort to attain an equilibrium than a real adjustment.

On Labrador there arose a loading of the earth's crust because of the inland-ice covering. The load increased as its mass increased, and when the load had grown heavy enough the earth's crust began to sink. The amount of sinking

varied, however,. it was greatest where the ice pressure was greatest and diminished successively towards the edges of the loaded area. Then the sinking continued until the glaciated area gained an approximate equilibrium with its surroundings. Conversely, when at the beginning of the late-Glacial time the added weight of the inland-ice was gradually reduced and the earth's crust again became lighter, the latter started to rise slowly in an effort to attain a new equilibrium with its surroundings. As the inland-ice clearly melted very quickly in late- and post-Glacial time, the rise can be supposed to have been



Fig. 117. Looking west over the raised marine beaches at lat. 54° 6′ N between Cape Porcupine and West Bay. In the foreground the open ocean. Aerophoto the author, July 1939.

relatively more rapid on Labrador than in Fennoscandia. This conception, the 'ice pressure hypothesis' or 'ice control hypothesis' thus includes the assumption that the rising of the land proceeded continuously, without jerks, but at varying speed, which increased to a maximum during the late-Glacial period and then decreased progressively, continuing slowly even after the removal of the ice load.

Raised beaches all along the coasts give striking evidence of an integral upheaval of land. Now, it is well known that the shorelines are found only at vertical intervals, cf. Fig. 117, and between these no noticeable terraces are found. The formation of a wave-cut terrace presupposes a period of rela-

tive quiescence of the shore. Regression is thus broken by brief halts. The shore-line of the sea has thus periodically been moved to its present position.

This apparent contradiction is readily explicable if it is remembered that not even the surface of the ocean can avoid rising and sinking. When the great masses of land-ice were formed the water for the ice was mostly taken from the oceans, and therefore their surface must have been dropped nearer to the centre of the earth. But it rose again when those masses slowly melted out and were assimilated into the oceans. Consequently every important change



Fig. 118. The highest marine shore towards the west from Goose Bay at 45.7 m above sea level. In the lower left corner the shore of Goose Bay is visible. In the background is Hamilton River just above Mud Lake. Aerophoto the author, July 1939.

in the earth's climate, as well as many other causes, has produced an upward or a downward movement of the surface of the sea.

The influence of this factor — already in 1842 brought forward by MACLAREN — is not to be neglected. The results of different calculations have proved that the thickness of the water layer removed from the ocean during the maximum of the glaciation in the Wisconsin-Würm time was some 300 feet. But since the ocean floor may have risen in response to the decreased load on the bottom about one-fifth of that amount the actual lowering of the ocean surface was perhaps roughly 240 feet (cf. TANNER, 1929, DALY in 204 a, etc.; ANTEVS in Journ. of Geology, Vol. XLVII. No 7, 1939).

But of course other influences than the climatic variations have also been at work: every change of the capacity of the ocean basin must have affected the geocentric height of the sea level.

While the earth's crust can be considered to have been subjected to long-periodic, rather continuous but unequal, differential upheaval in response to the thickness of the added ice-load, the surface of the sea underwent relatively short-periodic changes, i.e. its geocentric distance alternately increased and decreased several times during the upwarping of the land. Studies



Fig. 119. Marginally formed stream terraces to the west from Goose Bay running toward the right, obliquely over the fall-lines. They are cut across by the highest marine shore in the foreground. Aerophoto the author, July 1939.

carried out in Fennoscandia prove empirically that after the Ice Age the movement of the surface of the sea passed through a whole series of positive and negative phases, sometimes leading to an increase of the geocentric distance, sometimes to a decrease (Tanner: Bull. Comm. Géol. Finlande, No 88, 1929). If the upward movement of the surface of the sea at one place was more rapid than that of the earth's crust, the shores became flooded, i.e. a transgression occurred, and that extended to a point where both movements were of the same direction and speed. Where the shore halted a strand-line was abraded by the sea. The successive displacement of the limit of transgression, viz. the shore-line, must thus show a characteristic alternation of relatively sudden rise and fall.

After investigations lasting more than a quarter of a century, the writer succeeded in empirically coordinating in one graph the numerous raised beaches distributed all over Fennoscandia. This was entitled the epeirogenic spectrum of Fennoscandia. The innumerable raised shores proved to belong to certain definite groups, of which each contained only isochronous shore formations. Thus each such group represents a so-called beach-surface and registers a definite ancient position of the hydro-spheroid. Now, the epeirogenic spectrum shows the present positions of all the beach-



Fig. 120. The highest accumulation of shore stones and shingle on the eastern side of George Island in Hamilton Inlet. Upward from the shore the bedrock is deeply weathered and the morainic gravel is in flow. Photo the author, 8. Aug. 1937.

surfaces in Fennoscandia after they have been successively removed by the upheaval of the land from their original position at sea level.

From the Fennoscandian epeirogenic spectrum it has become clear: 1) that (in general) the higher a beach-surface lies in the spectrum the older it is; 2) that the nearer the beaches appertaining to one and the same beach-surface lie to the centre of the area of land-upheaval the higher they are above sea level; each beach surface thus slopes towards the periphery of the area where upheaval has been at work, and this proves that the earth's crust itself must have undergone a deformation; 3) that, on the other hand, within the peripheral parts an inverse relation can usually be observed in that an older beach

surface is intersected and transgressed, i.e. covered, by the next younger beach surface.

These conditions must repeat themselves in other areas, naturally with certain systematic modifications.

By means of the complex phenomenon of changes in level, therefore, an intercontinental homotaxonomy of the isochronous late- and post-Glacial marine formations on an objective basis must be possible all over the earth. Yet here we cannot go more deeply into this matter and the reader is referred for more detailed information to my special works (e.g. in Bull. Comm. Géol. Finlande No. 88, 1929; or Comptes Rendus Congr. Int. de Géo-



a.

b.

Fig. 121. The northward slope to the south of the anchorage at Ford Harbour in the Nain district. a. The marine shore at 73.4 m above sea level; looking from the west. b. Above the bluff behind the man is seen the giant soil-flows which have destroyed the higher shore formations; highest marine shore at that place is computed at 82.9 m. — In the foreground the highest black spruce bushes at 51.8 m above sea level. Photo the author, Aug. 1939.

graphie, Paris 1931, T. II; or Arctica [Leningrad] No 4, p. 21, 1936); cf. also Daly's (Proceed. Amer. Acad. of Arts and Sciences, Vol. LI, No 4, 1915; and Amer. Journ. of Science, Vol. X, 1925; and 204 a here) and Ramsay's (Bull. Comm. Géol. Finlande, No 66, 1924) fundamental works. Here it must be added that if the epeirogenic spectrum is worked out for another upheaval area in the same latitude — in this case Labrador — the spectrum can be expected to show agreement with the Fennoscandian spectrum. By this means the isochronous beach-surfaces and their deposits will be automatically and definitely identified on both sides of the North Atlantic, in other words, this will enable us to reconstruct the late- and post-Glacial isochron-

o u s paleogeographic development in respect of topography, climate, biology, and archaeology for the two northern continents.

For this purpose I conceived the idea of organizing a party which should explore the Labrador region and bring back definite information regarding the change of level and its general geographical conditions.

One of the principal aims of the expeditions from Finland was just to work out the epeirogenic spectrum of Labrador. It is the writer's intention to make a thorough report concerning this work when investigations are completed, and I will therefore here confine my description to some preliminary information.

The practical exploration of the raised beaches, etc., in Labrador, has shown that this task is a good deal more difficult than one supposed after experience in Fennoscandia. Some advice to future explorers may therefore be useful before they begin their research work.

Criticism is especially necessary in Labrador when collecting shore-line observations.

Uplifted, wave-cut, practically horizontal rock-benches lying one above one another occur at different altitudes in northern Fennoscandia and provide an excellent opportunity for classifying the beaches and connecting them with the different beach-surfaces. In Newfoundland-Labrador such series of benches are only to be found in the steep cliffs of Cambrian sandstone between Pinware Bay and Anse Sablon at the southernmost shore. But at suitable places all along the Atlantic coast a single bench cut in the bed-rock is to be found and it lies at the present seashore; Fig. 113. Those rock terraces have a special origin. In abrading the horizontal shelves the eroding tools have been: 1) the freezing of the water in joints and cracks in the rocks lying in the zone exposed at low tide and subsequently breaking them up, and 2) the smoothing out of the shelves by the moving of the frost-riven debris as well as pebbles along the terrace-plane by the force of the ocean waves. In this way the conspicuous benches were formed along the present shore. Higher than at the present sea-shore no benches of this kind have been discovered outside the sandstone area.

There are in many places also other kinds of benches. These are to be found in massive igneous rocks up to and still higher than the highest marine shore line, the m a r i n e l i m i t. PACKARD believed they were cut back by the sea, and in many cases this is possible. Meanwhile exactly the same bench



Fig. 122. River terraces cut during the late- and post-Glacial epochs in the late-Glacial delta deposits near Muskrat Falls in the Hamilton River. Looking north. In the foreground the Hamilton River. The old parabolic dunes indicate that the prevailing direction of the wind is westerly. The vertical edge of the picture is about one km long. Aerophoto Canadian Airways.

topography is found high above the highest marks of the sea in the interior of the country. They may there have arisen from the plucking of the inland-ice and the erosion of the melt-water rivers as the inland-ice withdrew. The benches there are in size, form, and position controlled by the planes of jointing which sometimes, as for example in the archipelago of Sandwich Bay, can be astonishingly nearly horizontal but not completely like the wave-cut rock terraces. PACKARD, after sounding in the vicinity of the Straits of Belle Isle, stated that series of such benches drop away step by step to great depths below the sea level, exactly as they rise above it. The jagged nature of the rocky benches at Strawberry Harbour is extended at least to a depth of 240 feet — a few rods from the shore — for in dropping the kedge anchor it would fall on to a rocky shelf, then drag and fall 20 fathoms lower on to another shelf, etc. Fine examples of this kind of bench are to be found on Cape Harrison, Cape Strawberry, Ice Tickle, Aillik Bay, on Huntingdon Island etc. The presence of such a succession of rocky terraces has been considered evidence that the coast stood higher when the benches were formed than at present (174). These benches are however rarely of great breadth or length, nor are they usually horizontal. Nor is their occurrence limited to the submarine areas. They have been developed by rifting on gently curving master-joints and are not to be confused with the horizontal terraces worn by the alternate freezing and abrasion of the inter-tidal zone on a rocky shore. These oblique benches, slanting towards the sides, cannot therefore be taken as evidence of a certain halt of the seashore relative to the slope during the process of elevation. Cf. the benches of the Cambrian sandstone area (p. 242).

The series of wave-built terraces, so conspicuous a feature in the Fenno-scandian inlets and channels, are not very common in Labrador. They seem to have almost slid out in Labrador, cf. Fig. 126, so that only in a few places can a series with several beaches, one above the other be found, whereas conspicuous solitary raised beaches can certainly be seen here and there from the sea. Such beaches are however, as a rule, built up of such coarse material that reliable measurements of the relative height of the sea level at which they were formed are not obtainable. Where the slope is less and more feeble, terraces and beaches of course occur and precise measurements of their altitude are easily obtainable. But in such spots it can not seldom be proved that sliding or solifluction has affected the beaches and altered the primary relation in altitude which existed between the uplifted shores. In many places the amount of these disturbances cannot be checked.

In nature, the selection of a series of raised shores worth measuring is thus extremely delicate. This is due not least to the difficulty of recognizing and studying their features in the heavily-wooded, black spruce areas.

In several valleys splendid terraces can be found, but the terraces of the seashores and of the river banks do not correspond, the top of the latter lying

normally somewhat above the then sea level, and they are probably built up by river erosion and accumulation. Moreover, as has already been shown (p. 203 sqqq.), inland-ice remnants have in many places dammed the outlets of many valleys, forming freshwater lakes in which terraces were laid down. The spillways of such ponds ran over the ice remains and also formed terraces where they impinged on the flanks of the valley. Many shores at higher altitudes may have been formed in such bodies — often small — of fresh water ponded between the ice and the uncovered land or by the spillways of these ponds.

It is of especial interest to determine in the coastal fringe the upper limit below which the glacial drift has been more or less removed by wave action. Yet there arises often the question: Were the shores formed by wave action in fresh or salt water, and were they formed at a horizontal water level or along the shore of a spillway which drew off a pond dammed by the inland-ice? There are in some places indications that in the closing stages of glaciation the ice receded towards the coast and detached ice-remnants lay for a long time among the off-shore islands, damming up the river mouths and the melt-water. The external shapes of the melt-water formations seem at first glance to be completely identical with those of the seashore. Fossils are always lacking and only by a very thorough investigation by mapping can one decide the true character of a shore under consideration: whether marine, lacustrine or fluviatile; at a distance it is impossible to decide this. Even on the spot it can be extremely difficult in the dense, virgin forests of black spruce to decide whether a slightly slanting, lateral stream terrace (kame-terrace) is being considered, or a marine shore; a detailed levelling with tube and stick is the only way to decide the question. On the heavily moss-covered surface in the black spruce thickets it is wiser to refrain from trying to determine the spot where the high water line once lay than to introduce unreliable figures into the research work. In this way one is in Labrador faced with the overcoming of considerably greater technical difficulties than in Fennoscandia. Raised beaches unaffected by secondary disturbances do not occur in the coastal districts of Labrador so generally as in Fennoscandia.

Undisturbed beach formations can, however, be found sporadically at varying elevations above the sea. In favourable spots, where the declivity of a gravel covered slope is not so great that the older, higher lying beaches have been obliterated by a sliding out due to undercutting by the breakers of the sea at a younger period, it is possible to find abrasion terraces worth measuring. As an example of this may be quoted the beach formations from the following places (+ = powerful, ++ = very powerful, r = the crest of a shore ridge, h.s. = highest shore):

Bait Zoar (in the slope of a fluvio-glacial accumulation (cf. p. 208).	Schooners Cove	Francis Bait Cf. Fig. 165.	Webb's Brook Cf. Fig. 185.	High Island. II western side	Slambang	
—	—	—	—	—	146.04++	
—	—	—	—	118.08	— ++	
105.96+	—	—	—	—	116.36	
96.29+	—	95.70+	—	—	—	outwash zone
—	—	94.71 plateau	—	—	—	
—	—	93.27 r	—	—	—	
—	—	91.30	—	—	—	
—	87.90 h. s.	90.24 plateau	—	87.21	—	
83.09++	↑	—	83.38 h. s.	—	81.17++	delta
75.40		71.52++	76.44++	—	—	
—	↓—	—	71.02	71.41+	72.72+	
68.21	67.69 r	—	69.06	—	—	
65.03	65.39 »	—	66.06	—	—	
—	66.02 »	65.06+	65.67+	64.13	64.92+	
—	64.29 depress,		—	—	—	
—	63.28 »	—	63.35+	—	—	
—	60.30 r	60.02+	—	—	—	
50.18++	58.43 »	58.10	58.53	58.48	—	
—	56.34 »	—	—	—	—	
—	55.00 »	—	55.47	—	54.25+	
—	51.66 »	—	—	—	—	
—	50.44	—	50.79	—	—	
41.03+	49.52 r	—	44.69	45.70+	—	
—	46.90	—	43.98	—	—	
—	43.08	42.85	42.36	—	—	
—	—	40.83	40.69	—	—	
39.04	39.83 r	38.33	37.13	38.16+	—	
32.46++	37.71 »	—	33.60	—	37.81	
—	35.61 »	—	—	—	35.64+	
—	31.29	—	—	31.73+	—	
21.54++	29.37	—	—	—	—	
—	25.34 r	—	—	23.55+	24.53	
—	21.89	—	20.07++	20.32	—	
—	16.65	18.27+	17.35	—	—	
—	14.49	13.66	—	13.69	13.02+	
—	—	9.97 r	—	—	8.93+	
—	—	7.35 »	—	—	—	
7.20++	—	6.50 »	—	—	—	
—	—	6.28+	—	—	—	
—	4.10	3.00 r	—	—	—	

— The basis used for all levellings of altitude has been the white stripe on the rocks formed by the upper limit of the small, white cirripeda *Balanus balanoides* easily distinguishable about 0.2—0.6 below the uppermost limit of living *Fucus vesiculosus* and 1.1—1.6 m below the kelp-strewn tide mark, cf. Fig. 112. All the figures with two decimals have been obtained by levelling with tube and levelling stick. —

As is clear from the above tables, there is no indication of beach formation on some parts of the slopes, and the soil there is in its composition and surface forms quite like the morainic gravel surface usually found above the highest marine limit. The explanation of this is that on account of the action of freezing and thawing the soil began to move after the uplift and the beach formations have in many such places been buried by the down-glided masses, so that one cannot imagine that the sea once flowed there. The northward slope south of the anchorage at Ford Harbour is a good example of this; Fig. 121b. Measurable abrasion terrasses were only found higher up on the northward slope, while the lower-lying abrasion terraces are well developed on the south-west slope west of the harbour.

Southward from the anchorage. Eastern part.	Western part.	Westward from the anchorage.
(c. 83.0)	82.93	—
— ↑	77.75	—
—	73.44 ↑	—
—	70.56	—
— solifluction	— 121a	68.46
—	66.80	—
—	63.33 (foto)	—
—	57.70	—
(c. 53.0)	55.29+	—
—	52.91	—
47.80	↑	—
—	the whole	45.72
—	slope in solifluction,	—
—	partly tundra;	30.81
—	cf. Fig. 121b.	—
—	↓	—
—	23.31	—
—	tundra	14.79
—	↓	3.15

In some cases it is even on the spot impossible to decide with certainty whether an erosion zone has originated from the bare washing of the rocks by a lateral melt-water stream or has arisen through the sea's abrasion. For

example there is such doubt about the bare-washed zone which at Francis Bait stretches from the highest shore ridge at 67.69 m up to 87.90 m; Fig. 165. There I measured the highest limit for the erosion marks at 87.20 m on the north-east side, at 87.98 m on the south side, and 86.94 m on the south-west side of a hill of which the lower slopes are washed completely bare. These figures strongly support the assumption that the zone of washing here arose through the sea's abrasion. Yet, a comparison is demanded with the beach formations in the neighbourhood before it can be considered proved that the highest limits of out-wash here are marine.

It is also difficult to decide whether the erosion remains of certain ancient delta surfaces were laid down in the sea or in lateral ice-dammed ponds; for instance at Ujaratsuduraluk in Tikkoatokak Bay in the Nain area:

Ujaratsuduraluk.	Tingit.	Webb's Hill.
	—	164.2 plateau
—	—	161.7 »
138.14—138.9	—	—
delta-remains	—	—
132.42	—	132.7 »
102.65	—	101.91 »
93.18+	97.74+	92.3 r
83.93++	86.23	89.51 plateau
	80.97 red.	85.02 »
78.93	79.64	77.45 »
	71.96+	74.16 »
63.03++	68.35+	
	60.24+	
58.27	—	—
54.03	—	—
53.12+	—	—
50.11	—	—
48.91		—
47.57		44.0 plateau
33.01+	35.32	
28.00	26.90+	25.75
10.35	—	16.57++
—	—	15.5+
2.61	—	—

Meanwhile it is fairly certain that the delta formations at 161.7 m and 164.2 m at Webb's Hill in the Nain district (above) as well as at 94.74 m—97.17 m at Moliak on Lake Melville, like the level crest surface at 91—100 m of the plateau esker south-east of Rigolet (p. 214), are supra-marine formations.

They lie about 35 m higher than the highest connected beach-surface on the inner part of Hamilton Inlet and Lake Melville. Low's highest figures for the beaches at Backway are up to about 200 feet.

Very powerfully developed, sometimes hundreds of meters broad benches covered with shingle, with cliffs 5—12 m high, are wave-cut in Cambrian sandstone of the most southerly fringe of Newfoundland-Labrador, where they are found quite generally at Blanc Sablon, Forteau Bay, Schooners Cove, Ance à Loup and Pinware (cf. 832 a, 833). For example at Schooners' Cove I measured twelve broad rock benches one above the other (see Table p. 239). When later I compared with each other my measurements of these terraces and my levellings at Pinware on the one hand, and on the other with my measurements of wave-built terraces in the gneiss area west of Henley Harbour, I had the same result as Dunbar: only a few of the terraces really correspond. As Dunbar has already pointed out, the cliff terraces between Blanc Sablon and Point Amour are in reality rock benches due principally to differential erosion in unequally resistant flat-lying strata. The reasons for his view are: 1) the terraces are apparently lacking on the granite and remarkably developed on the flat-lying Cambrian strata. 2) The Cambrian undulates a good deal, and certain beds are always bench makers, regardless of their elevation; for instance the bench at the top of the sandstone is at 222 feet at Blanc Sablon, decreasing to 60 feet east of Anse Eclair and to near the sea level at Forteau Point, rising again to 250 feet near Forteau and 285 feet behind Crow Head. 3) The terraces are not at accordant levels in successive sections along the coast. 4) Deltas or bay-head stream deposits are lacking (833). The same remarks hold good for the benches at Pinware.

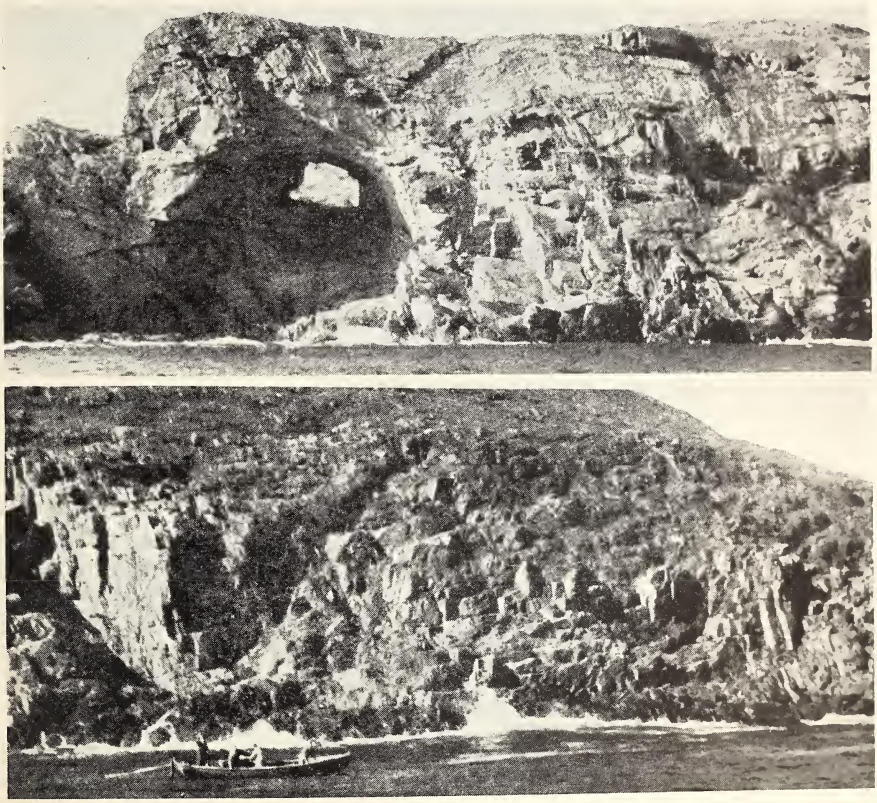


Fig. 123. Looking from the south over the sand delta deposited by Goose River in Goose Bay. Aerophoto by the author, July 8th 1939.

Undoubtedly the sea has laid down shingle on some of these rock shelves. However, when working up my material at home, it has proved impossible to decide at what level the marine depositing ceases here and the deposits laid down by lateral streams begin.

The evidence of the uplifted shore-line features.

From the notes given above it should be easy to understand how difficult it must be to prove which of the shore-marks were formed simultaneously and to correlate the old shores chronologically in beach-surfaces. For Fennoscandia I have previously showed (Bull. Comm. Géol. Finlande Nos. 18,



a.

b.

Fig. 124. a. The 'Hole in the wall' at lat. 52° 41′ N eroded by breakers during a period when the land was lower relatively to the surface of the sea. b. Fishermen baiting a trawl close under the cliffs north of Cape Bluff. Photo the author, Aug. 1937.

1906, and 21, 1907) that the principle of correlating the highest beaches at different places with lines assumed to indicate equal uplift, so-called isobases, was founded on a false analogy, because the highest beaches are almost metachronous, i. e. of different ages in different places, younger near the centre and older at the periphery. The only safe principle I know is to begin

with the correlation of the youngest terraces and to form beach-surfaces of them and then to try to deal with the still higher, older shore marks in the same way. By tracing by means of the terraces carefully measured at different places the plane of the successive beach-surfaces, beginning from the youngest and finishing with the oldest, many subjective considerations can be avoided. It is of course impossible to avoid erroneous inferences in an epeirogenic spectrum in some places (for instance in those which have been affected by later seismo-tectonic movements); but from such a spectrum, even if faulty in some details, it is much easier to discover both mistakes in the correlations and anomalies and errors in the measurements than from an isobase-map summarizing the generally incomparable data of the heights of the highest beaches.



Fig. 125. Recent slidings in the morainic gravel cover on the northern shore of Lake Melville eastward from Pearl River at about Long. 59° 17′ W. Photo the author, Aug. 2nd 1937.

In this way, a system of traces is obtained also for Labrador, sloping from the centre towards the periphery. Of these each higher, older trace slopes more than the one below. From this diagram it will be found that the nearer one approaches the centre of the uplifted area, the younger the highest shore is. The beach-surfaces to which the highest shores near the centre belong pass successively beneath the traces of the beach-surfaces in a more peripheral situation.

This step-wise drop of the highest shore to a younger beach-surface towards the interior, which I found in 1905 in the northernmost part of Fenno-scandia, was in 1930 pointed out by Cooke for eastern America at the Gaspé peninsula toward the south from Labrador (Fig. 3 in 174). The absence of a higher shore series in the west of Gaspé was also there explained as due to the fact that the upper part of the St. Lawrence valley was filled with inland-ice when the Gulf region had become open water and the highest beach-surface had formed in its eastern part.

In my spectrum for Labrador there are still many uncertain details, and I consider it not yet appropriate for publishing; therefore only some extracts from it shall be mentioned.

My provisional epeirogenic spectrum of the section Hamilton Inlet — Hamilton River drainage system involves at least fifteen beach-surfaces. The terraces which form the highest marine limit are not even here synchronous, but the highest limit has been found younger and younger proceeding from the sea toward the interior, if one excepts the uppermost terraces which have arisen during one and the same transgression and therefore belong to the same beach-surface. Along from Hamilton Inlet to Lake Melville's western end the marine limit lies as follows:

At Holton at 77.50 m on beach-surface XV.

At Bluff Head at 49.00 m on beach-surface XI.

At Goose Bay at 45.75 m on beach-surface VIII.

Towards the south-west of Goose Bay the highest shore comes to an end at an altitude of 45.75 m; cf. Figs 118 and 119. The shore surface VIII must, however, run up the river valley, but this has not been investigated.

Between the beach-surfaces mentioned in the table the marine limit must of course lie at intermediate beach-surfaces, but I have not found shore-line features which should indicate any one such surface.

Yet not even in the direction along the coast can it be assumed that the highest marine limits are chronologically equal. On the contrary, my measurements north of Hopedale show that the highest marine limits rise towards the south:

3 miles SSW of Mugford Tickle						the	marine	limit	is at	69.86—71.01 m.
Lindenberg Island	on the W side					»	»	»	» »	68.69 »
Slambang	» » E »					»	»	»	» »	81.17 »
Sandy Island	in the centre					»	»	»	» »	83.36 »
Zoar	on the W side					»	»	»	» »	96.10 »
Windy Tickle	»	»	»	»	»	»	»	»	» »	98.76 »

These observations are made on a line lying practically at right angles to the last movement of the inland-ice border and nearly on the same 'isobase-latitude', i.e. on a line where the rise of the land has proceeded with the same speed. The figures must therefore be fairly nearly comparable (see below).

Around Hamilton Inlet, on the other hand, the highest shore lies lower:

at Holton at 77.50 m.
» Sandbanks at 54.86 m.

but rises again towards the south-eastern corner of the peninsula; it is thus at

Francis Bait at 67.69 (or 87.90?) m.
Schooners' Cove at 96.29 (or 105.96?) m.

These tables show that the height of the marine limit increases somewhat southward as far as Hopedale, then decreases somewhat up to Hamilton Inlet and Domino, after that increasing again towards the southern part of the peninsula.

These conditions are not at all surprising. They are the logical consequences of the fact that while the land-ice was melting the rise of the land was in progress. For this reason the marine limits lie in a beach surface gradually becoming younger in such districts from which the inland-ice last withdrew



Fig. 126. The naked rocky land south from Windy Tickle. Photo the author, Aug. 1939.

and highest in the earliest deglaciated bays and archipelagoes. The low figures for the marine limits at Hamilton Inlet and Lake Melville are in accordance herewith. On the other hand the figures above show that the strip of coast at Straits of Belle Isle became ice-free earlier than the coast at Hamilton Inlet. This is for me surprising. In contrast to what I had been accustomed to find in Fennoscandia the highest marine limit in similar rocks such as the Cambrian there, e.g. on the eo-Cambrian sandstone at Fishers' Peninsula and in Finnmark, I found the sandstone rocks above the highest marine limits at the Straits of Belle Isle comparatively slightly weathered. This condition can indicate that the inland-ice left Labrador also at the Straits of Belle Isle comparatively late.

We are thus in a position to state that the upheaval of the land during late-Quaternary time on Newfoundland-Labrador proves in principle to be in complete agreement with the corresponding conditions in Fennoscandia.

Careful study in the western parts of the great North American area of upheaval has shown that there is a break in the tilting of the terraces towards the periphery of the upheaval area: from a so-called 'hinge-line' they are now horizontal. As far as is yet known, all the land of Labrador is situated inside the 'hinge-line'.

In Labrador's upwarping, however, there may have occurred disturbances producing anomalies in the fixed proportion in altitude between the beach-surfaces stated above. Disturbances must have been produced by e.g. seismotectonic movements. When the stress-balance in the earth's crust has been disturbed in a rising area, the tension accumulated for some time locally becomes repeatedly rebound under the form of a shock, resulting probably from a re-arrangement in the mosaic of huge partial blocks in the earth's crust mentioned above. Such diastrophes can therefore scarcely pass without affecting locally the distances between the uplifted beach-surfaces. On January 21st, 1809 and for some days afterwards, severe earthquake shocks were felt on the northern part of the coast, and are said to have been general all down it. The Moravian Brethren who made the observation supposed that earthquakes were of common occurrence with the supposed rapid rise of the land. On Nov. 30th, 1836, a sharp earthquake shock was felt at Hopedale, another in Hebron in 1857 (325). Moreover, it is supposed that the St. Lawrence River below Quebec lies upon a fault zone that bordered the up-moving block to the north (174). This area is still seismic (cf. Ogilvie, 1926, about the earthquake of 1925). On the north side of the submerged Laurentian River valley (p. 225 sq.) a wide, deep depression joins it and runs up to the Straits of Belle Isle. This depression is considered as being due to downfaulting (592 a, 672, 966, 174). The area south of Newfoundland is likewise seismic (335, 336).



Fig. 127. Looking north over the Kikkertaksoak. Three diabase dikes are seen behind the lagoon. Aerophoto Forbes-Grenfell Expedition, 1931.

Without assuming a recent sinking movement of the peninsula's northern parts as a whole it is difficult to give a plausible explanation of the occurrence of certain bay-mouth lagoons; Fig. 127, and some submarine deltas (cf. also p. 252). To enter into detail regarding this and other questions however, the time is not yet ripe, so I content myself with referring to the special work on the epeirogenic movements of Labrador which will be published in due time.

In many tracts the geographical outline of the peninsula underwent considerable changes during the process of upheaval. At the time when the inland-ice remains in the lower parts of the valley burst, and the sea could enter the interior, the great fiords, e.g. Sandwich Bay, Hamilton Inlet — Lake Melville drainage system, Kipekak fiord, etc. were sending narrow ramifications up the river valleys. In the Hamilton River the head of the fiord was at Gull Rapids in the Naskaupee River Valley up to Bold Mts. However, the coast being mostly steep in Newfoundland-Labrador, the divergencies from the present shore were not very considerable in general. It was otherwise on the northern and western seaboard. It is probable e.g., that the low area extending across the peninsula from Richmond Gulf over Lake Minto to Pain Bay on Ungava Bay, was completely covered by the sea at the local close of the Glacial period, so that Cape Wolstenholme was situated on an island. In another publication I hope to have an opportunity to return to this subject. There is, however, a detail upon which I must touch here:

The continuance of the rise of land at the present time.

We have already concluded that the land has not fully recovered from the depression due to the weight of the inland-ice. Theoretically, therefore, the upheaval should be still taking place. Among the settlers of Labrador also, there is a general opinion that the land continues to rise. Bell has reported some observations indicating that at the Hudson Bay coast drift-wood, fresh looking shells and shallow water deposits as well as shore works of bygone generations are found at considerable heights above high tide mark. From all these observations it is obvious that the land is continuing to rise at the shore of Hudson Bay, he concluded.

The Moravian Brethren, as early as in the beginning of the 19th century, supposed that the rise of land in Labrador at the Atlantic seaboard was extraordinarily rapid. It was supposed that an upheaval of ten to fifteen feet had been confirmed within the memory of fishermen. Gosling also noted that

a man who had been fishing in Holton Harbour for thirty or forty years had observed that the spot where he used to moor his vessel was at that time above the water (325). DALY (200) was also of the opinion that the elevation process is continuing: with no theory to support or refute, many reputable observers among the population could tell him of cases where rock-ledges have come perceptibly nearer the surface of the sea and new channels for the passage of their boats have had to be sought among the shoals, while the stages must again and again be lengthened over their bedrock foundations in order to obtain sufficient depth of water to float their small craft. From this it may be assumed that the upheaval is continuing, he concluded (cf. also 204 a).

In spite of these arguments it is not possible for the writer to agree unreservedly with the opinions of the BRETHREN, BELL, PACKARD and DALY that upheaval is still continuing along the Atlantic coast, even though the settlers have expressed the same opinion to him. The only good reason for it I have heard is that in recent times some bays or narrow tickles have become shallower, and some small islets have become joined to the mainland. The cases shown to me on the spot are however not convincing and can easily be explained by the simple fact that shingle beaches have been built up over some shallow tickles, e. g. at Aillik, and that some narrows have been filled with shore material, transported by the combined force of breakers and longshore currents. One piece of evidence against the supposed elevation is the strong, wave-cut benches worn in the bed-rock at present high-tide marks here and there in suitable spots along the coast from near Hebron and Mugford Tickle, Fig. 113, to George Island in the Hamilton Inlet and northern Newfoundland. These benches must indicate that the ocean shore lay in the same position relative to the land for a very long time (cf. p. 232). One can, however, argue against this that the horizontal rock shelves were lifted some distance above sea level and then drowned again in a later rise of the sea level. In this respect, too, the conformity to the state of the peripheral coastal fringe of Fennoscandia is striking (cf. TANNER in Bull. Comm. Géol. Finlande, No. 88). But of this I cannot yet give conclusive proof for Labrador. There is naturally also the possibility that the rapid rise of land mentioned above occurred in places which have been affected by rapid differential displacements.

The Moravian missionaries, the Postmaster at Nachvak and Dr. GRENFELL have fixed marks on the shores for the purpose of obtaining quantitative measures of the rate of upheaval. Unfortunately I have not been able to find any information concerning a possible change in height since the marks were fixed.

The late- and post-Glacial river deposits.

Repeated allusion has been made to the fact that narrow tongues of marine sediment extend up the main river valleys. After having made acquaintance with the process of land upheaval in Labrador, we shall return once more to the Hamilton River Valley and give some indications as to how its valley trains and delta deposits are to be interpreted.

At the end of the Ice Age all the rivers were heavily loaded with sediment which was dropped below the base-level, at their mouths in the river lakes or in the sea in the form of deltas. Good examples of this are the interior delta which was laid down in Winnikapau Lake — Fig. 74 —, and the marine delta in the arm of the sea stretching in late-Glacial time about 70 miles up the valley from the present river mouth with the proximal edge in the tract of Gull Rapid, the distal edge at Muskrat Falls [?]; Fig. 122. The coarse material was normally laid down nearest the river mouth, the sand was carried farther out, while the clay was deposited where the salt water was met, forming beds which stretched even beyond the place where the stream practically speaking ceased. Above the consecutive base levels the currents burdened with sediment worked to fill all the depressions and erode the thresholds in its bed, while endeavouring to form a so-called graded profile for its course. For this reason from the delta aprons valley trains stretch far up the valleys. Remains of large sandy deposits of this kind were to be seen from the aeroplane in the valley downward from the great bend below the junction with the Cache River, where the main river bends from a southerly direction to the east. Here the valley lies at least some hundred feet above sea level and the deposits are undoubtedly to be referred to an internal base-level; during late-Glacial time Winnikapau



Fig. 128. *Tafoni*-like weathering phenomena in pyroxene gneiss at the eastern side of George Island in the outer Hamilton Inlet. Photo the author, Aug. 1937.

Lake was such an internal erosion basis; cf. Fig. 74. The accumulation terrasses thus belong to different series, and the lowest series of accumulation terraces merge into the marine formations. These river-built accumulation terraces should not be confused with those subsequently cut in the accumulations, and which formed steps in the river banks, Fig. 122; it is often very difficult to decide where the transition from one kind of terrace to the other is.

After the rise of the land had proceeded for some time the water-laid sediments formed dry land. The gradient of the river increased intermittently (cf. p. 232); when the fall became steeper the river began to eat into its own deposits of an older period, the sediment was worn away and in small portions transported farther below in the water course to be deposited anew at places where accumulation was compatible with the new graded profile. Then the sand was laid down on the clay beds, and the flood gravel upon the primary sand layer, etc. In this way a considerable disturbance of the primary sequence of deposition arose in several places so that here and there, in consequence of re-depositing, in parts even an inverse sequence of strata came into existence. This inversion is just the main reason for the rareness of, for example, clay deposits on the coasts of Labrador. Clay in plenty is found here only on those places where the re-deposited covering has secondarily slid out and the deeper layers recently come to light. The corresponding inverse sequence of strata also arose when the sea breakers undercut the fine sedimentary deposits till they glided out and became covered by till, e.g. at some places on the north shore of Backway, where the occurrence of clay is betrayed by the muddy water far out in the bay.

The process of re-deposition was repeated after each change of level and the river deposits were always pushed farther out to sea. From every phase of increased erosion bits of new river terraces have remained on the valley sides; many are to be found above one another, e.g. at Muskrat Falls, see Fig. 122. The successive delta deposits of Hamilton River finally filled in extensive areas of the western part of Lake Melville. They reached over Goose Bay and Mud Lake districts away towards Epinette Point and even a bit outside it. The recent delta formations, which are still covered by the sea, stretch many miles out on the coast at a few metres depth. The tide and the waves contribute to the spreading out of the sediment and the levelling of the surface. To the building up of the delta the Kenamish and Goose Rivers have contributed not so little with their sediment. Goose River is very rapidly building up its own delta of sand; Fig. 123.

North West River, on the other hand, has not been able to contribute any

sediment to the Hamilton River delta. The deep basin of Grand Lake (measuring 140 fath.) is collecting the supply of sediment, which is heaped up already at the mouth of the Naskaupee River (p. 138), and at the common mouth of the Susan and the Beaver Rivers. Mrs. HUBBARD says that the course of the Naskaupee River below Bold Mts lies mainly through sand hills and terraces, its banks varying in height from a few feet to 60, 80, and even 100 feet.

Other rivers and smaller streams debouching into the Atlantic have also built up some small deltas, partly submarine of sand, silt, and clay; for instance Fraser River. The shores of the bays and the valleys which continue them inland have, at the northern seaboard, always steep, rugged slopes close to the water courses. The only level ground of any extent is to be found in the innermost parts of the bays or at some distance up the valleys, where the post-Glacial delta deposits have accumulated. In the lower Komaktorvik River valley a series of four terraces of gravel and silt, showing stratification, were found by ODELL (692). It is not clear what is the height above sea level of these terraces. In Nachvak the highest seashore was put by LOW at 180 feet, and by DALY at 250 feet.

TOWNSEND (950) says that the river terraces of the Natashkwan River rise from the mouth in the Gulf of St. Lawrence to 460 feet 70 miles from the outlet; the marine limit there lies at more than 400 feet (cf. Fig. 4 in 174). BRYANT (107) speaks of the occurrence of clay and sand beds in the valley of the Augustine River. HIND (434) reports that landslides near the 'Rapids' in the Moisie River have uncovered a series of incoherent sand some 60 feet thick resting on greyish-blue clay, 50 feet of which were visible above the surface of the water. The pale, bluish clay still appears higher up the river in sheltered spots 50—70 feet thick; it occurs chiefly under the lee of huge rocks at some distance up-stream from Sea-way-sini-kop portage.

River deposits are thus to be found probably in all the great valleys, but no systematic examination of these beds has been made as far as the writer knows.

The rivers running into Ungava Bay also have terraces. Mrs. HUBBARD describes such from the lower course of the George River. FLAHERTY mentions the terrace-like 'huge railway embankments in bas-relief', plastered along the steeply sloping granite ranges to a height of 200 feet above the Leaf River, some 70 miles from its mouth; their height increases to a maximum of 250 feet as one approaches the sea. This altitude roughly corresponds to that of the terraces LOW reported from the lower Koksoak and George Rivers, where they do not exceed 300 feet. At the foot of Manitou Hill, a few miles above the mouth of the Stillwater River, LOW found a layer above 40 feet thick of

stiff blue clay, believed to be of marine origin. From the Pain River Valley marine terraces have been noted at a maximum height of 300 feet.

These few instances from widely scattered points of observation go to prove that even in regard to the terraces of the river valleys there is a similarity to Fennoscandia. Yet, because of the lack of topographical maps and their extremely complicated relations these river terraces could not be subjected to detailed investigation; this would have presumed that the geologist devoted the greater part of his summer solely to levelling and mapping, a work which in the black spruce brush which borders the river banks can only be done extremely slowly. And in studying changes of level the barometric determination of heights is not sufficient; greater exactness is necessary.

* * *

Observation.

It has seemed appropriate to the writer to give here a preliminary outline of our present knowledge and some hints regarding the chief problems of the geology and physiography of Newfoundland-Labrador in so far as the scanty and incomplete observations make it possible, in the hope that they will facilitate the work of future explorers. As must already have appeared from the record, the account must not be looked upon as definite in every detail. The present writer's experiences fully agree with Odell's opinion (694) that a thorough understanding of the geologic evolution of the Labrador peninsula and its present surface configuration is a matter for the future, as yet little more than scattered observations have been recorded from this remote region, and it is risky to go too far in co-ordinating them now.



1 2 3 4 5 6 7 8

> 0 m > 4000 4000—3000 3000—2000 2000—1000 1000—400 400—100 < 100

Fig. 129. Bathymetric map of the north-western North Atlantic (859).

1. = > 0 m; 2. = < —4000 m; 3. = —4000—3000 m; 4. = —3000—2000 m; 5. = —2000—1000 m; 6. —1000—400 m; 7. —400—100 m; 8. = > —100 m.

Part II. The Sea and the Labrador Current.

The Labrador Sea.

The bottom conformation of the north-western North Atlantic is represented by depth contours on the map, Fig. 129 (following 859, 865 a, 898 a, 217 a, 800 a, 643 a, 643 b). From an oceanographical point of view this western portion of the north-western Atlantic Ocean has a rather individual character, being embraced by the normal drift of arctic ice, and includes, so defined, the waters around and on the Grand Banks and northward to the seventieth parallel of latitude.

North and north-west from the Newfoundland Basin (cf. Fig. 129) is a wide gulf bounded on the west by Baffin Land, the North American continent, and Newfoundland with the Grand Banks, and on the north-east and east by Greenland and the Reykjanes Ridge, this is the Labrador Basin with depths from 2000 to 4000 meters, but in some spots slightly more than 4000 meters. Continuing north-westward to the sixty-third parallel the basin's bottom grades upward more abruptly to depths slightly less than 700 meters in the north-west in the region of the Davis Strait Ridge. An eastern appendage, the Irminger Sea penetrates from the Labrador Basin toward the north-east between the Greenland Slope and Reykjanes Ridge. Thus the Labrador Basin is shaped like a heart. At the Davis Strait Ridge the slope is reversed, the bottom receding to form the Baffin Bay Basin with depths greater than 2000 meters.

The western half of the Labrador Basin, the Labrador Sea (859) is the subject of our interest here.

The Labrador Sea communicates with the North Atlantic by a comparatively narrow winding channel east of the Grand Banks. The western outlets, Kennedy Channel, Hudson Strait and Straits of Belle Isle are all shallow, reaching not far below the continental shelf. The shores present an interesting contrast: along the Greenland slope the basin rises steeply to a narrow con-

tinental shelf, while on the Labrador side there is a large shelf and a well-defined marginal slope. The American shelf is bounded by the 400-meter contours broadening from a width of 70 miles off southern Baffin Land and northern Labrador to a width of 180 miles off Newfoundland and thence southward; at the Grand Banks and the Flemish Cap it becomes one of the broadest of continental shelves. The Reykjanes Ridge and Flemish Cap are separated by a tortuous channel deeper than 4500 meters.

An important bearing on the hydrographical conditions are some secondary bathymetrical features on the American slope. In the latitude of Hudson Strait the 600-meter contour penetrating to within a few miles of Resolution Island includes a trough-like embankment. Another interesting feature is an elliptical depression about 60 miles long by 15 miles wide north-east of Hopedale, its deepest part in lat. 56° N. and long. 59° W being more than 200 m below the surrounding shoal. A larger, more irregular depression is about 120 miles north-east of Newfoundland.

The leading oceanographical features of the Labrador Sea.

Owing to a series of accounts based partly on incidental observations made by fishermen and traders and partly on systematic investigations of scientific expeditions (History of the exploration in 859), the main traits of the oceanography of the Labrador Sea are already rather satisfactorily known. Here we shall follow principally the results included in the report of the CHANCE Expedition in 1926 (482) and the MARION and GREENE expeditions in 1928—1931—1933—1934—1935 (859), which systematically studied the hydrographical conditions especially on the Labrador coast, and aim at presenting as nearly as possible what is known of the hydrographical system of the Labrador Sea.

At the margins of the Labrador Sea is a closed cyclonic current system of the upper water layers. The North Atlantic Drift sweeps in an arch from Flemish Cap towards Cape Farewell forming the south-eastern boundary (482). The East and West Greenland Currents form the northern limit. Finally the Baffin Land Current and the Labrador Current as the western boundary close the circuit (800 b). Inside this circulatory system there seems to be a mass of quite motionless water (Matthews 642), cf. Fig. 130, or else the central portions of the body of the Labrador Sea have only a slow counter-clockwise motion (859).

A vertical section, Fig. 131, shows that three principal types of water characterize this sea: coastal, arctic and atlantic. Their mixture with a remarkably small range of approximately 1° C temperature and 0.06 $^0/_{00}$ salinity fills about 90 $^0/_0$ of the Labrador Basin. The greatest changes in physical character occur at the sides of the basin. At the Tail of the Grand Banks atlantic water is found with a temperature of 16° C. and a salinity of 36.00 $^0/_{00}$, off Cape Farewell with 6° C. and about 35.00 $^0/_{00}$ and still farther north in the Labrador Sea 4° C. and 34.80 $^0/_{00}$. The arctic water mainly designates that of which the temperature is so low as to indicate a distant northern source; it often has a minimum temperature as low as — 1.7° C, and indicates water which has originally flowed from more northern areas than that where it is observed. The salinity of the arctic water is between that of atlantic and coastal water. The coastal water derives from land drainage and river discharge, melted ice bergs and ice floes and is, by the absorption of solar radiation in summer, rather warm. It is in the lowest brackets of salinity, and because of its lightness expands seaward over the shelves or banks or is transported along coastal slopes. Winter chilling may cool coastal water to temperatures approaching that of minimum arctic character.

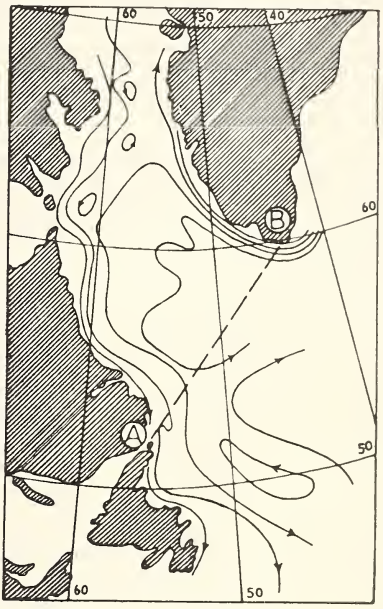


Fig. 130. The system of circulation of the upper layers of the northwestern North Atlantic (859).

We will now consider one of the most interesting phenomenon of Labrador:

The Labrador Current.

It was earlier usual to consider the waters flowing south along the American continental shelf from Ellesmere Land to the Grand Banks as pertaining to one current, the Labrador Current. However, the latest investigations necessitate a division of it into two principal slope currents. The arctic current shortly after crossing the Davis Strait Ridge is joined by a branch of the West Greenland Current of greater volume; cf. Fig. 130. By the fusion of these waters

the physical character of the current is fundamentally altered south of the ridge, and a new name is required: the L a b r a d o r C u r r e n t. It is this combined current we shall consider here.

Long ago it was well known to the sailors that the surface waters moved southward all along the Atlantic coast. Large icebergs of the most various sizes and shapes, pinnacles, mushrooms, crater-like and large tabular arctic forms in all shades of green and with blue-green veins approached from the north after the shelf ice had broken up. The drift southward continued all the summer as demonstrated by the majestic cavalcade of the bergs. The drift of the 'Polaris-floe' party during the early spring of 1873 showed that the drift was surprisingly fast : it averaged 14 miles a day from Cumberland Island to

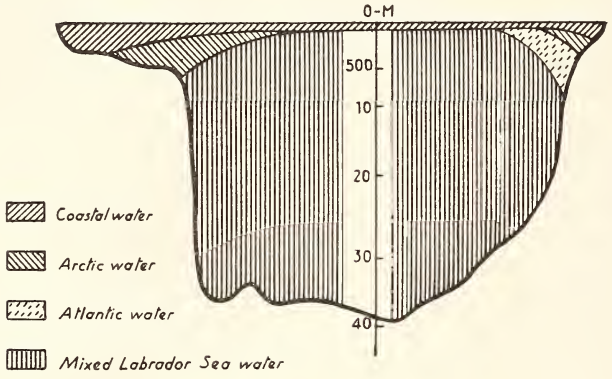


Fig. 131. A schematic vertical cross-section of the Labrador Sea from Belle Isle to Cape Farewell. Cf. Fig. 130 (859).

Hamilton Inlet (753). The current which carried the floe was always pressed towards the shore because every movement in the northern hemisphere is deflected to the right hand from its path by reason of the rotation of the earth.

Recent research has given more detailed figures. Iselin (482) estimates the average velocity of the Labrador Current at some 10 miles a day; in spring and summer this may be somewhat higher. In the narrow but strong current of Nachvak he found a drift of at least 20 miles per day and off Sandwich Bay, where the current was wider, 14 miles. These observations were made after the spring thaw had given fresh impetus to the current and may be somewhat higher than the average velocity for the whole year. With the dying out of the land drainage in the winter and as the coastal strip is protected by a covering of pack-ice from the prevailing north-west winds the speed of the current must be much less than the figures given above. Smith, Soule and

Mosby (859) calculated in the summer of 1928 far greater velocities in the axis of the current: up to 38 miles per day; Fig. 132. An acceleration of the speed of the current occurs south of Hudson Strait and is attributed to the confluence of the West Greenland Current from the east and the discharge from Hudson Strait on the west.

The Labrador Current is a so-called 'gradient current', the direction and speed of which is determined by the slope of the different isobaric surfaces in the mass of water and by the earth's rotation. To map ocean currents is essentially to define the topography of the surface of the sea by observing temperature and salinity (Examples on pp. 261, 263). The water lies highest above the reference surface to the right of the current's direction in the northern hemisphere. The speed of the current is inversely proportionate to the distance between the isolines.

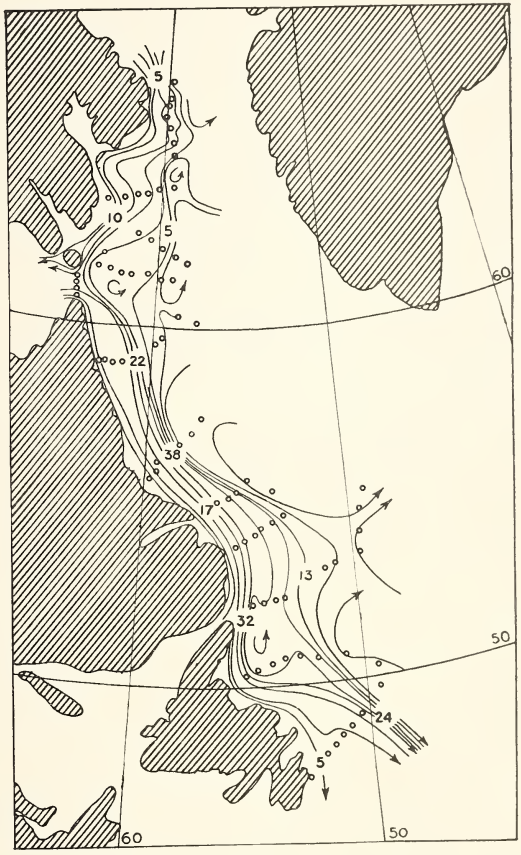


Fig. 132. The Labrador Current. July 22—September 11, 1928. The velocities shown in miles per day indicate the axis of maximum flow (859).

The surface current map, Fig. 132, also reveals that the inshore margin of the current enters along the northern shore of the many embayments and gulfs. Such circuitous arms however rejoin the main stream sooner or later in the form of discharges from the southern sides of the same estuaries. Especially noticeable in this respect are the major openings of the littoral. Considerable quantities of the current enter along the Baffin Land side of Hudson Strait, 60 miles across, by rounding Resolution Island, or passing through Gabriel Strait. Icebergs have been carried by this inflow 150 miles; but near Big Island they nearly all recurve and

drift out past Cape Chidley (858 a). At the mouth of this embayment (cf. Fig. 132) a cyclonic circuit occurs. The 15 miles wide Straits of Belle Isle reveal a prevailing set inward on the north side of the Straits and outward on the south side; bergs grounded on the banks in the Straits show the path of the current (216). Continuing down the coast it follows an easy sinuous course with two major bends, the one between Cape Harrigan and Cape Harrison, and the other between Cape Bauld and Funk Island. Opposite these bends a greater number of ice-bergs are always to be found than elsewhere; cf. Fig. 130.

In the summer the Labrador Current receives contributions all along its inner edge, from the Hudson Bay, and from the mighty discharge streams flowing from the many lakes on Baffin Land and Labrador. This addition from the reservoirs of fresh water along the inshore side of the current is thought to counteract the continued increase in salinity. The temperature of the body of the current is meanwhile maintained (the layers of water are vertically stable, and the solar warming is but little propagated downward by convection). Further, the water released by melting bergs and pack-ice is continually compensating the salting which the current receives along its outer margin, counteracting what little heat is transferred to the lower waters. The shortness of the summer and the fact that sea-ice fringes the coast all the winter and usually until July have the same influence. The mean bulk of water, but little changed, is therefore creeping south-eastward to the Tail of the Grand Banks where it meets the Gulf Stream, which seals its fate.

The offshore margin of the current emerges at the Davis Strait Ridge bounded by cyclonic vortices; see Fig. 130. These are replaced from Hudson Strait to Hamilton Inlet by bands of currents converging from the Labrador Sea, Fig. 132. Further southward northerly counter-currents occur at the edge.

A striking feature revealed by the current map for the summer of 1928 — Fig. 132 — is the tendency of the stream lines to group themselves in two bands, the one colder, over the inshore portion of the shelf, the other somewhat warmer, deeper and more rapid, over the deepest part of the slope. This may have been due to different causes, for instance the bottom configuration in combination with the different origins of the waters fused in the current (cf. 859). This banding has an effect on the drift of ice-bergs (858 a). The flow-bands of the current are often noticeable by mist-stripes; Fig. 153.

The description given is based on the conditions in summer 1928 (859). However, it should be constantly borne in mind, that fluctuations occur from year to year. The point of junction of the Baffin Land Current and the West Greenland Current, as well as the geographical position of the margins of the

Labrador Current, its physical character and the distribution of its velocity are probably subject to considerable fluctuations in different years.

The variation of the surface velocity are obvious from the following table indicating miles per day (from 859):

	1928		1931		1933		1934	
	shelf	slope	shelf	slope	shelf	slope	shelf	slope
Nachvak Fiord	6.0	12.0	1.3	15.1	0.0	12.0	—	—
Cape Harrigan	7.2	17.5	4.9	10.3	0.0	9.1	—	—
Hamilton Inlet	8.4	10.0	4.2	9.6	0.0	21.1	—	—
Domino Island	8.2	8.2	6.2	6.2	0.0	14.9	6.2	14.9
Belle Isle	12.4	3.1	4.3	4.3	8.6	10.8	—	—
Average (including sections in White Bay and St. Johns)	7.6	10.3	4.1	8.8	5.6	12.3	4.2	13.0

Marked icebergs offer a good opportunity here to map in detail the direction and speed of the Labrador Current in different years.

We have hitherto explained the properties of the current as it occurs on the surface of the sea. But it stretches rather deep under the surface. In order to make a systematic study we have therefore to consider its physical properties and its extension vertically. For this purpose we shall take the following two cross sections off the Labrador coast measured and recorded by ISELIN (482):

I. The Sandwich Bay Section runs out at approximately right angles to the general trend of the coast from a point twenty miles south of Hamilton Inlet; Fig. 133. The stations were made between July 28th and 30th of 1926. Within 120—135 miles from the coast between the two outer stations is to be found a transition from water of 0° to 4° C. It is interesting that MATTHEWS (642) also places the temperature wall within three miles of its location in Fig. 133. Likewise in both the *'Chance'* and the *'Scotia'* (642) sections the coldest water, at —1°, extends outward as a thin tongue at a depth of between 40 and 100 meters, as shown by the bulging of the isotherms. Further both profiles show the water 2.5° warmer at the bottom of the gully than on a level with its rims. The profile shows the coldest water, —1.5° to —1.8°, very close to the coast. Inshore, where the water is less than 180 meters in depth, the profile shows no warming near the bottom. The Labrador Current water being relatively light spreads out on the surface and rarely extends more than 200 m downward in any of the profiles. Below this it is mixed with warmer offshore water. The warmer surface water coming out of Hamilton Inlet extends to a point about 18 miles from the coast and to a depth of 25 m.

Thus in the profile one recognizes four types of water: 1) the warm, relatively fresh, coastal stream receiving its character from the outflow of river waters

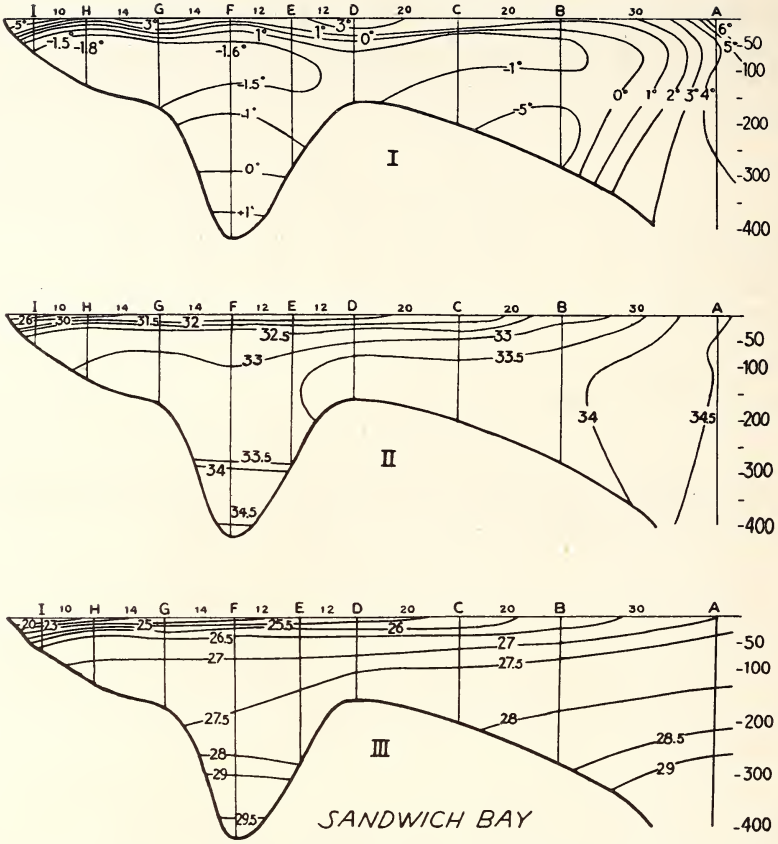


Fig. 133. Profile across the Labrador Current off Sandwich Bay, July 28th to 30th, 1926. I. Temperature, II. Salinity, III. Density (482). Cf. Fig. 135.

from Hamilton Inlet, 2) the icy, true Labrador Current water which presumably comes from some region far to the north, 3) the warmer, more saline mass of the offshore oceanic water and 4) the bottom water of the deeper parts of the continental shelf which is a mixture of these last two types of water.

The salinity profile confirms these conclusions: the isohaline of 34.0 ‰ marking the outer edge of the truly arctic water corresponds in position to the isotherm of 0°.

The density profile shows comparatively regular density lines with their inshore ends all slanting downwards; the dynamic slope is clearly shown by the curve for 27, and the curves for the outermost stations also show a decided slant even at a depth of 300 meters. The density profile thus indicates that the water has a tendency to move southward. From station A to station E the gradient is 20.9 dynamic centimeters in a distance of 82 miles, which points to an average

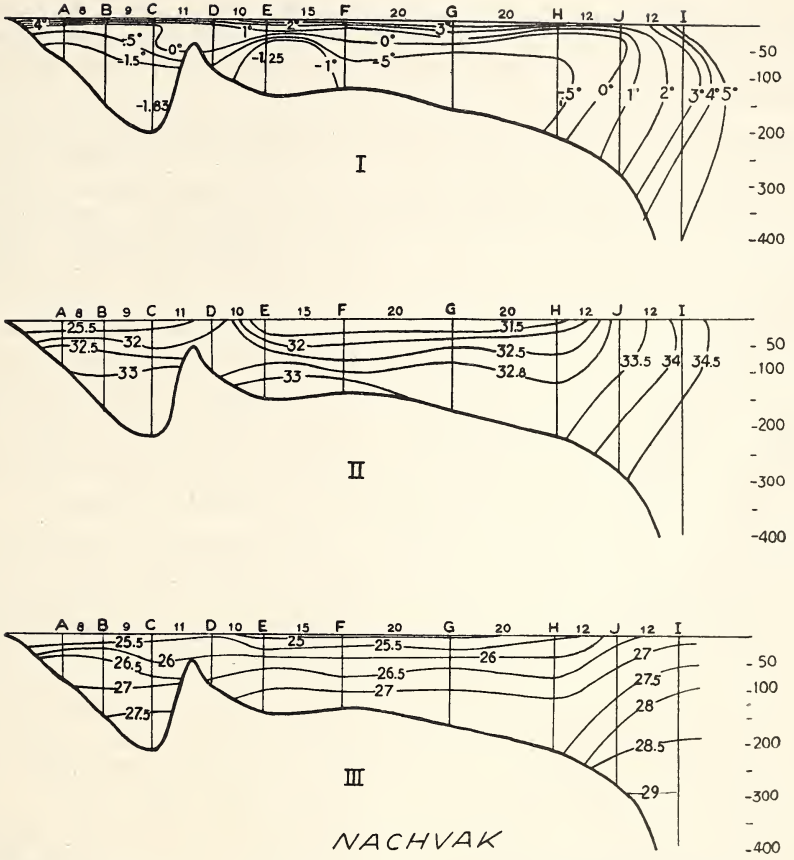


Fig. 134. Profile across the Labrador Current off Nachvak Bay, August 11th, 1926. I. Temperature, II. Salinity, III. Density (482). Cf. Fig. 135.

current of about 0.3 knots. The flow is fairly evenly distributed over the whole width of the continental shelf. Finally, the coastal stream of much warmer, fresher water is to be considered as »a current within a current».

II. The Nachvak section of the 11th August 1926, Fig. 134, runs 75 miles offshore to the edge of the continental shelf in a direction nearly at right angles to the general trend of the coast; cf. Fig. 135. Here the bottom slopes gradually from 120 meters near the land to 300 meters at the edge of the shelf, and thus the current here flows over a narrower and shallower platform than off Sandwich Bay. The coldest water, below 0°, is here about 45 miles narrower than in profile I; water as warm as 4° all through its mass from surface to bottom has been encountered on the Nachvak at the profile's eastern end.

The two profiles agree rather well. In neither case does the coldest water quite reach the coast-line, being separated from it by a band of fresher, warmer,

land-drainage water close in along the shore. It is probable that this long-shore current runs inside the arctic water along the whole length of the outer Labrador coast. In both profiles the coldest water extends offshore as a tongue at a depth of from 30 to 200 meters.

Meanwhile there are some minor points of difference reflecting local causes. In the Nachvak profile there is no warmer water drawn in underneath from off shore under the light, icy current water. No water was as cold as the coldest water in the Sandwich Bay section, although one would expect lower temperatures in higher latitudes. Perhaps this anomaly follows from the fact that this profile represents a more advanced stage of summer warming. The low surface temperature between the two outer stations is explained as due to twisting movements and eddies. Further inshore the water layers were more stable. The surface shows more solar warming.

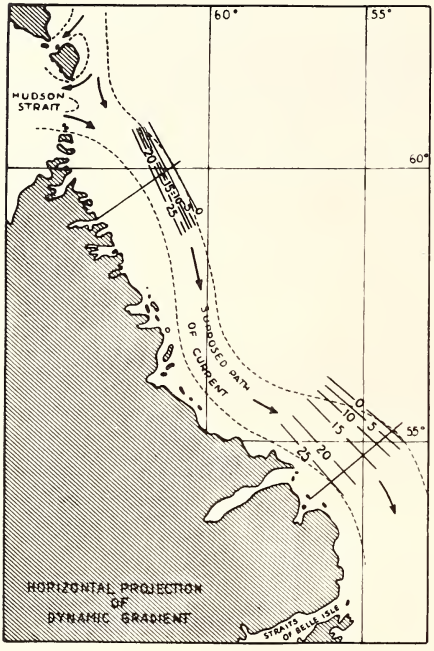


Fig. 135. The Labrador Current. July 28—August 11 1926. The position of the Sandwich Bay and Nachvak Bay sections is indicated; cf. Figs 133 and 134. The dynamic gradients are indicated with 5 cm intervals (482).

In the region of station D in Fig. 134 the water is practically homogeneous from top to bottom. This is explained as due to the southward movement of water which has been well churned by the strong tides in Hudson Strait as well as in passing over the shallow reefs that run off shore for 15 miles just north of this section. Any water which rounds Cape Chidley must pass over this reef and is well mixed by the time it reaches the mouth of Nachvak Fiord.

The salinity profile shows a correspondence between temperature and salinity but, because of the shallower continental platform, the salinity is somewhat lower especially near the bottom as in the Sandwich Bay profile; only in small amounts can water of greater salinity than 33 $^{0}/_{00}$ overflow the shelf here. Probably the incorporation of Hudson Bay water lowers the salinity and may account for the fact that the isohaline of 32 $^{0}/_{00}$ here lies at a greater depth than farther south. The position of the isohaline of 34 $^{0}/_{00}$ corresponds to the isotherm of 3°.

The density profile in Nachwak too shows a distribution of current-propelling forces differing from that in the Sandwich Bay profile. Here all the curves are approximately horizontal as far out as station H, but show an abrupt tilting between H and I. This indicates that the strength of the current was

active in a belt 25 miles wide, centering about 70 miles off shore. Thus the dynamic gradient lay between the three outer stations with a rise of 24.8 dynamic centimeters between stations I and H, but no appreciable gradient from H to the coast; cf. Fig. 135. At the surface between the two outer stations the calculated average velocity is 0.67 knots, between J and H 0.98 knots.

The dynamic gradient shown on the two profiles is presented in Fig. 135. The diverging of the streamlines southward in the summer of 1926 suggests a fanning out and slowing down of the current from north to south; cf. also Fig. 132. Figs. 132 and 135 show further that the Labrador Current is not as wide as it has usually been represented on current charts in atlases of for instance BARTHOLOMEW and DEUTSCHE SEEWARTE: the cross-section of the water colder than 0° measured in 1926 12.25 square miles as it passed through Davis Strait, 55 sq.m. off Nachvak and 124.5 sq.m. off Sandwich Bay. The agreement does not seem to be close; the explanation of this fact may be that section I represents a stage in the life of the current seven weeks earlier. We must of course expect a gradual dying-off in volume and velocity as the summer advances. Taking into consideration the very similar temperature and salinity distribution we may expect that the volume too remains within wide limits about the same from end to end. This appears from the following table (859):

The volume of water flowing south in the Labrador Current. Millions cubic meters net (= waters flowing south minus waters flowing north):

	1928	1931	1933	1934
Nachvak Fiord	2.00	4.74	7.64	—
Cape Harrigan	5.27	4.35	2.09	—
Hamilton Inlet	4.75	2.77	4.93	—
Domino Island	5.06	1.31	7.60	5.03
Belle Isle	2.60	3.31	7.01	—

To sum up, ISELIN concludes: The Labrador Current may be classed as a long narrow stream of coastal water, the character of which is maintained throughout its length by land drainage, favoring winds and melting ice. This coastal current is in sharp contrast with the warmer, more saline water in contact with its outer edge, being part of the homogeneous central core of the Labrador Sea. This latter is apparently affected by no physical factors strong enough to set up important dynamic movements.

The Bays and the Fiords.

The main lines of the current system thus are clear. In the border districts, between the open ocean and the fiords, on the other hand, the conditions are presumably more complicated. As already stated, the seasons play a role here; during the summer the land drainage, including the melt-water from the snow-covering, is carried farther out to sea than the drainage water in winter. A striking factor affecting the Labrador fiords is the land drainage. Its water flows out on the surface of the fiords forming a film of nearly fresh water. This explains why the surface is almost barren of life and the beaches remind one more of a lake than of a seashore (482). The Labrador current blocks off the fiord basins from the effects of real oceanic water.

If the entrance to a fiord is wide and deep there must be some interchange between its water and the Labrador Current outside. It seems fairly certain that the pumping action of the tide effects a slow, steady circulation of the upper layers of water. In the northern bays the huge icebergs, wandering in and out with the tidal current, indicate the circulation; this was very conspicuous in Hebron in July 1937. Thus, about the same temperature conditions are maintained inside the bay as out over the continental shelf; the water is seldom more than 45°—48° F in the bays, whereas it can be 70°—80° F in the lakes on the neighbouring mainland. Under the surface film is to be found a layer of very cold water $< 0°$—1.5°, which is thought to originate during the winter, and by the surface layer is protected from the warming influence of the sun during the summer. To this type belong Nachvak and Saglek Fiords, investigated by Iselin.

If the inlet is shallow, however, there is little chance for salt water to enter the bay, while several good-sized streams supply comparatively warm, fresh water in abundance during the summer. In this case, the bay is practically a lake and cannot be compared with the deep fiord type or inlet. Sandwich Bay, the broad, shallow inlet, with a shoal entrance only six meters in depth, belongs to this type, and most likely Lake Melville and Double Mer too. A closer study of the hydrography of the Labrador fiords is very desirable.

— An instructive difference does exist between the waters of the Labradorean and the Norwegian fiords. The deeper parts of the latter are filled with much warmer (2°—6° C) and more saline (34—35 $^0/_{00}$) water than the former. The Labrador Current cuts the bays off from the ocean influence.

In conclusion it may be stated that the oceanographic conditions at the Atlantic coast of Labrador are, in the main, the reverse of what they are at

the Atlantic coast of Fennoscandia. To the north of something more than 40° lat. N. the Gulf Stream ceases to affect the North American coast: the mass of warm water glides slowly away towards the east because of the earth's rotation, and then meets the Polar water of the Labrador Current at the south-eastern edge of the Newfoundland Banks, at the so-called c o l d w a l l. The temperature falls at the contact by anything up to 15° C in a distance of a few miles. There the Labrador current is neutralized.

Some effects of the Labrador Current on climate and biota.

At this rather southerly latitude climate on an average should be relatively warm. It degenerates, however, under the influence of the icy drift. The low summer temperatures of the coastal stations are largely due to the presence of the Labrador Current (99; cf. p. 296 sq. further on).

The effect of the Labrador current on the climatic conditions can extend very far, even over to the European shore. One of the causes modifying the influence of the Gulf Stream on the temperature conditions of the northern waters of the North Atlantic, and probably one of the most potent, is the encroachment of the Labrador current, as shown by HEPWORTH. Its increased activity (1903—7) evinced by an increase of ice in the north-western Atlantic, was in general followed by a diminution of the temperature of the surface water in that portion of the North Atlantic represented by the Florida-Valencia zone. Moreover, the fall in sea temperature was associated with a corresponding fall in air temperature at some British meteorological stations, and in the colder months of the year with an increase of pressure; HEPWORTH explains this as due not to the ice but to the cold, ice-bearing Labrador Current, especially if an increase in the activity of the Labrador current is synchronous with a decline in the velocity and volume of the Gulf Stream (430).

On the American coast the effect of the cold air over the Labrador Current does not reach so far. It is expressive that frost has been recorded every month in Hebron, whereas the interior has generally four months in summer free of frost (99). We shall return to these questions in Part III.

Another disadvantage due to the Labrador Current and rendering traffic difficult is that it has a bad reputation for unusually frequent fogs; Fig. 150. Perhaps it was not merely a peculiar coincidence that Labrador first appeared to me emerging from fog and that a bank of fog enveloped the last glimpses of its coast when we sailed away from it. But the fog will be further discussed in the next section (p. 316 sqqq.).

The Labrador current has a very great influence on the biological conditions of the land — its fauna and flora — on the coastal fringe of Labrador. It will later be made clear (p. 363 etc.) that the degeneration of the vegetation shown

in the barrenness of the coastal rim is due to the cooling and drying-out effect of this enormous discharge of icy, arctic water.

The Labrador Current has, however, also a more favourable effect on life. Practical experience has shown that the production of plankton is inclined to be greatest in those areas where warm and cold oceanic water masses meet and intermingle. Now the Labrador Current spreads arctic plankton southward and the water upon the shelf bears swarms of it. Plankton being the food of the fish, this explains the great abundance on the banks of Newfoundland-Labrador especially of cod-fish and herring which in midsummer approaches close to the shore.

In the northern fiords of Labrador, as already mentioned, the littoral belt is surprisingly poor in organic life and the surface layers are more or less barren of diatoms. A reasonable explanation is that the excessive land drainage produces a light and stable surface layer which prevents a vertical circulation, and thus the few organisms are prevented from being carried upward from the deeper, more saline water. On the other hand, in the northernmost fiords, near Cape Chidley, which are not so thoroughly blocked by the inshore current of low salinity and land drainage, and which also have a great tidal range, there are a greater variety of phyto-plankton with oceanic forms. The presence of the oceanic forms, scattered well inshore, points to a continuous addition of oceanic water all along the outer edge of the Labrador Current. Iselin, however, states that research has only shown that nowhere is there an exceptional flowering of diatoms. Only at one station (off Sandwich Bay) could the Labrador diatoms be said to be really abundant. On the whole then, the surface mikro-plankton of the Newfoundland-Labrador coastal water is found to be relatively poor during July—August (482; with a list of species noted).

In contrast to all this the animal plankton probably occurs much more frequently in the surface water even near the shore.

In August, when the waves break, the spray is intensely phosphorescent and very like fireworks. Nowhere have I seen such splendid »Meeresleuchten» as all along the coast of Labrador, from Port Burwell (400) to the Straits of Belle Isle, where at every stroke of the oar the surface water is broken into countless luminous beads.

The freezing and breaking-up of the coastal waters.

The surface layer of the coastal water is of course warmed somewhat in summer, but it is mingled with the cold water of the Labrador Current and constantly carried away to the south. For this reason the coastal water

freezes surprisingly early in late autumn. It is undeniably astonishing at Nain, for example, that in this latitude which is relatively southern, being about that of Aberdeen, sailing in the archipelago must frequently cease in October, but usually at least in November, because the sea has frozen.

The inland lakes and rivers always freeze before the coastal water. Although systematic observations on this factor are lacking, the following information will serve as some guide:

The 10th of November, 1930, the lakes of the Lake Plateau were frozen. The thickness of the ice then increased successively: on the average, according to the Indians, the ice on Lake Mishikamau is 7′ 6″ thick; in Lake Winnikapau Low found the ice 4′ 9″ thick (588).

At the end of October in a normal winter Hamilton and Grand Rivers are frozen and fur animals' skins are at their best, say the trappers in North West River; in a normal winter the ice is 7′ thick (99). The smaller rivers, however, freeze earlier, especially in the north. HUTTON says (476) that at the end of September, brooks in the Okkak district crawl lazily over ice-filled beds; snow will quickly cover the hills (478). In October the brook at Okkak comes oozing over a deep bed of ice; in November it is frozen solid. By February the ice on the rivers is generally 8′ thick (476).

The coastal waters are not covered with ice until much later. Near the North West River the shallow water at the end of Lake Melville freezes completely between the 1st and 15th of December. Lake Melville, itself a deep tidal lake, has in recent years frozen about December 20th. Grand Lake freezes some days later than Lake Melville, but sometimes not until the beginning of January (the lake is very deep). At Rigolet, Hamilton Inlet rarely or never freezes over before the middle of January and in some winters does not close at all (? probably the narrows are meant) (588).

Sandwich Bay generally freezes over in the end of December, and it may be taken that most of the large fiords of the Atlantic coast close about the same time (588).

The anchorages between Holton and Cape Harrigan freeze at the end of November, it is said, but it has happened that the shore water there has a thin ice covering already at the end of September.

At the end of September or in October, bleak and silent, writes HUTTON (476), the beach at Okkak will be crusted with ice, crackling and booming as the tide lifts it or leaves it, lapped by a leaden sea. On November 27th, 1903, in the evening, HUTTON continues, the calm water of Okkak Bay had a muddy surface, and in the morning there was ice. But this usually happens in early December. The sea begins to 'smoke', a fine, white haze lies on the water, drifting like a mist before the wind; the time of ice is near. The haze lasts three or four days. Then comes a keen, calm moonlight night and the sea settles into an oily scum and in the morning there is no more sea, only a wide stretch of dull, grey ice, tough and elastic. After two or three days it is safe, even at some distance from the shore. The ice is firm and smooth (475); but the ice surface does not remain smooth. Some days after freezing the surface becomes slushy,

the salt works out, and soon a snowstorm covers the ice with hard waves and ridges of snow, a couple of feet deep.

After the coastal water is frozen — at the latest in the middle of December — the frozen edge grows farther and farther out towards the ocean. Beyond this edge — the 's î n a' of the Eskimoes — there floats an unbroken drift of pack-ice for some time still towards the south, in some places containing great icebergs. Finally this confusion also freezes as far as the eye can see. In the winter Labrador is surrounded by an inpenetrable compact ice boundary, and by a wreath of ice blocks and ice fields.

This fringe of ice is Labrador's winter road. But it is a dangerous road, for the tide plays havoc with the ice, it opens cracks and lanes at quite unaccountable places, and in a labyrinth of lanes a man can be caught in a critical situation. The road is always treacherous, also because storms or heavy swells may come from the east at the shortest notice. Admiral BAYFIELD stated that he never saw a heavier sea than that which at times runs from the east e. g. into St. Lewis Sound, even as far up as the entrance to the inlet. A tremendous swell often comes in without wind, rolling slowly as if moved by some unseen power, then increasing in speed as it nears the shore until it bursts over islands 30 feet high or sends spray 50 feet up the sides of the precipices; the roar is deafening (48 b, 434). The ceaseless hum of the ocean swell is heard day and night as the breakers dash upon the rocks and pile up masses of ice like a wall on the beach. The winter road had disappeared already when easterly winds began to blow.

When during the winter the ice breaks up travelling becomes impossible. Only the Eskimo has then the courage to risk the fringe of ice at the foot of the cliffs under which the black water turns and tumbles and grinds the floating pans of ice against each other. To my mind, says HUTTON, the Eskimo is the very personification of dogged pluck.

G r o u n d- g r u. In Labrador it is universally known that the seal nets and ropes freeze under water during cold, clear nights. When this happens the nets must be taken up immediately, or else they will be lost because they float like corks and then form a solid block of ice. This is the phenomenon known as a n c h o r or g r o u n d i c e, also called g r o u n d-g r u or g l a c e d u f o n d. It covers late in the autumn also the rocky and stony bottoms in open water as deep as 60 or 70 feet and perhaps more (252, 510 a, 434), and also the bottoms of lakes and rivers and coves. FERLAND reports ground-gru on the shore of the Gulf of St. Lawrence at a depth of 60 feet. The deposition of such ice is also usual in the sub-arctic and arctic rivers. The phenomenon is also known from arctic Fennoscandia. In that case the rivers are raised in their beds, the water swells over the valls and great changes are produced in the trend of the rivers

and in many places the water is forced to branch out in a tangle of bewildering channels.

It is very mysterious how the ground ice comes into existence. Some explorers consider that it is due to the strong nightly heat radiation, an opinion very difficult to accept from a physical point of view. Others believe it arises by the freezing of undercooled water which the turbulence of the water brings into contact with stones on the bottom. It can also be thought that ground-gru is formed where fresh water from submarine wells becomes mixed in the cold salt water of the ocean, <—1° C. (Cf. BARNES, H. T. Ice Engineering. Montreal 1928, and DEVIK, OLAF. Thermische und dynamische Bedingungen der Eisbildung. Geofys. Publ., Vol. IX, No 1, Det Norske Vidensk. Akad. Oslo 1932.)

In the spring the ice breaks up very late.

At the lakes of the Lake Plateau the Indians told HIND on 10th June, 1863, that they would then find them full of ice (434). On the 1st of July 1839 the ice was still firm on Mishikamau Lake, and the borders of Naskaupee River were still lined with ice in June, some of it ten feet thick (610). The rivers break up and the snow melts at the Straits of Belle Isle about 10th June. The brooks begin to rustle again also in the north when the June sunshine warms the poor earth a little, and when the snow melts they cascade down the hillsides as raging torrents. In the first half of June every brook becomes a whirling barrier that no dog or sledge can cross. The great rivers, however, break up earlier; Hamilton River about 10th May at its mouth, but considerably later in the interior. On 29th June, 1905 Mrs. Hubbard found the shore of Naskaupee River at the foot of Three Mile Rapids lined with ice banks 8 and 10 feet thick, though above them violets were in bloom. On 3rd August, 1905, she saw large masses of ice, like miniature bergs, floating in Lake Mishikamau, and a short distance below her camp of 24th August (see map) she found that a long bank of ice, 3—4 feet thick, was still clinging to the boulders half way up from the water.

The shallow western end of the salt water lake Lake Melville opens again between 15th May and 15th June (588). According to information in North West River Lake Melville has lately usually broken up in the middle of May, though in 1939 it was not until the middle of June; even as late as the 20th June, 1929, a patient was brought from Rigolet by a dog-sleigh to the hospital in North West River over the ice of Lake Melville. On Grand Lake the ice still lay the 25th June, 1929.

Hamilton Inlet [Grosswater Bay or Ivuctoke] breaks up in the middle of May; yet in 1921 the entrance was filled with ice on the 30th June, in 1922 in the middle of July, in 1860 the ice-covering was so thick that it could be walked upon as late as 18th July and above the ice-pack cubical icebergs rose as in the Arctic; the masses of ice were broken up and scattered by a south-west wind and disappeared shortly afterward out to sea.

At the beginning of May lanes arise in the archipelagoes between the shore and the ice-pack and spread themselves out more and more as the formation

of lanes advance to the north. In the narrow strips of open water which in this way appear near the mainland shore traffic with small vessels can begin as early as the middle of May. Yet it sometimes happens that the coast-water freezes even on a July night, as HUTTON reports in 1905, but such ice does not hinder navigation very much.

As early as 1729 Captain ATKINS stated that the Labrador coast is very early clear of ice, though a good distance out to sea are vast islands of ice [icebergs] (325, 62) coming from Hudson and Davis Strait. CARTWRIGHT (134) wrote: Of all the dreary sights which I ever yet beheld, none ever came up to the appearance of this coast between Alexis Bay and Cartwright Harbour in the spring. After the inner coastal water opens, much loose ice remains for some time driven about with every wind so that it is dangerous to anchor there, and right out towards the sea still lies a uniform, compact body of rough ice some 50—100 miles from the shore. This ice keeps the water as smooth as land would have done at that distance. The faces of all the hills fronting the sea are almost wholly bare rock. Spots where verdure is likely to appear are covered with snowdrifts long out in June. But no sooner does one enter the Sandwich Bay than the face of nature is suddenly changed. There the ice and snow have disappeared and the hills of moderate height are completely covered with coniferous forests; the shores are edged with grass and the waters spotted with ducks and drakes. When the lanes become larger coastal sailing begins at once, for every fishing-smack wants to be the first at the fisheries in order to choose its trap-berth before the cod comes in under the shore.

The belt of ice outside the coastal water also gradually breaks up and floats away as enormous i c e-f i e l d s. The Straits of Belle Isle are open at the end of May; following another notice the navigation in the Straits closes about the end of October and does not open until about the fifteenth of June (510). From 15th June the sea generally appears to swing free right up to Indian Harbour, at the end of June to Hopedale. Not until the end of June or the beginning of July is, for example, the anchorage between Holton and Cape Harrigan open. PRICHARD (761) stated that it is only possible to approach Nain during five months of the year; the coast enjoys open water from July to late November. Even if the ice in the fiords breaks up earlier in the end of June, the coast between Nain and Cape Chidley is considered to be rarely free from the ice-fields before the end of July. The shores of Killinek are also free of ice rather late; in 1906 Killinek Bay was not completely free of ice until the 22nd of September (400). During the months of August and September only the coastal water of Ungava Bay is comparatively free of floating ice, reports TURNER (965). In good years, like 1931 (275), the whole coast is free of ice early in July. In 1932, on the other hand, HUBBARD (275, 457 a)

encountered ice in dangerous quantities in mid-July at Cape Harrison, and at Port Manvers in the last days of July. This, however, was caused by a special obstacle:

THE PACK-ICE DRIFT

which comes into existence when the floating ice-sheet of the sea is transformed into a closely packed mass of pans and debris. Commander MACMILLAN is the



Fig. 136. Fishing schooners taking refuge against the drifting pack-ice in lee of an island about 40 miles south of Hopedale. Photo FORBES-GRENFELL EXPEDITION, 1931.

great expert of navigation on the Labrador Atlantic coast. In his experience the amount of pack-ice along the coast varies greatly from year to year. Usually it obstructs navigation till the latter half of July; some years the coast is open much earlier, while in other years the ice blocks persist virtually all the summer (275); cf. Fig. 136. Cf. 629.

Early in July, 1904, the ice had floated off at Okkak (476). And in June 1875 no ice was to be seen on the passage down to Holton (862). Such years, however, seem to be rather rare.

The MORAVIAN MISSION's reports (325), on the other hand, tell of very difficult ice conditions on the coast in several years: in 1811 the coast at Hopedale was blocked with ice until within a few days of the arrival of the Mission's ship on 9th September. In 1816 this ship arrived in the drift ice on 16th July when 200 miles from the Labrador coast and did not reach Okkak before 20th August. But the next day the coast was again blocked and the boat was not able to reach Nain until 22nd September. In 1817 the same conditions prevailed; the coast was beset with ice on 7th August as far as the eye could see. In 1836 the ice remained on the coast in a solid jam until the beginning of August. It was described as bottom ice [?] either wholly or partly concealed beneath a covering



Fig. 137. Drifting ice off the Okkak archipelago, July 11th, 1937. Copyright WILMONT T. DE BELL.

of water too shallow to allow a vessel to pass with safety. In 1838 the Mission's ship found the ocean entirely free of ice; in 1855 the ship fell in with quantities of drift ice 250 miles from the coast; in 1875 the ice lay on the coast until late July.

On 5th August, 1932, there was so much ice in the harbour at Hebron that an aeroplane could not have landed there (275). In 1937 the coast north of Kiglapait was blocked with pack-ice as late as 11th July; Fig. 137. On 22nd July, 1905, a mass of green salt-water ice still lay at Cape Harrigan. But in 1880 the northern ice had left the coast at Cape Harrigan, Paul Island and Hebron only by 31st July. According to the old chart the ice still lay at Makkovik on 24th August 1875, and at Windy Tickle the 13th August. Cape Harrigan was blocked by pack-ice until 1st August, 1932; WYATT stated that the pack-ice was thick

offshore between Cape Harrigan and Nain, and that his pilot had not seen it so far south in July for ten or fifteen years. On 30th July a fresh westerly wind blew the pack-ice away from the coast and he saw no more of it. In 1933 WYATT reports that the last ice-pack was seen off Cape Harrison on 4th July (275). The 7th of July of 1925 unbroken ice was lying to the north from Cape Harrison (614).

As far south and as far out in the ocean as Frenchman Island no ice was found in 1939 until 13th June. On 23rd June the same year the passengers and cargo had to be landed on the ice edge at Smoky; north of this place the coast then was completely covered with ice.

On July 4th 1900 the northern half of the Straits of Belle Isle was found to be impassable on account of a broad stream of pan-ice (200). This majestic procession of dazzling migrants from the north suddenly changed the coast into an arctic landscape; quietly they drifted into the bays under the impulse of northern winds and tide currents. Not until the 13th could one cross the straits this year.

Vast quantities of ice usually encumber Ungava Bay late in the summer, when a gale or wind sufficiently strong and lasting springs up from the south and forces the drifting ice out into the straits where, meeting the current pouring through them, it is carried out into the Atlantic. It is therefore late in August before the bay can be said to be navigable with any safety for vessels from the sea. By the end of September the navigation is again dangerous because of the length and darkness of the nights and the fury of the wind which blows almost constantly at this season from the north (208 a, 434). It can be imagined how difficult navigation is in Ungava Bay (265); its offshore shoals, combined with the enormous tidal range (p. 282 sq.), make it practically inaccessible to deep sea vessels. The ice-fields close in on the coast's innumerable small islands which form the actual shore line. Only by taking advantage of lanes as they open near the shore is one able to push forward.

All this shows that in the summer one is never really safe from pack-ice formation in the north. This formation varies very much from year to year and from day to day. During DALY's one hundred days voyage to Northern Labrador in 1900 he had been detained thirty-nine days at anchor against his will, sometimes because headed by the wind, sometimes immersed in thick fog and at others trapped by ice-floes (200). The ice-pack on the coast late in summer originates naturally from waters north of Labrador and brings greeting from the Arctic world, and its supply varies from year to year and depends on causes still unknown to us. Meanwhile the frequence of the pack is greatly dependent on the winds, too: strong offshore winds carry the pack out into the ocean and disperse it, whereas onshore winds force the ice pans close against the shore. Moreover, the frequency is also dependent on local conditions. At Cape Harrison, just north of Indian Harbour, where the shore bends to the west-north-west, the Labrador current frequently drives the pack-ice and ice-bergs against the barrier of outlying islands. Another such area where the

current presses the ice pack towards the shore is off Port Manvers. At such places it is wise to climb to some height and observe the ice conditions before proceeding farther. One can in this way decide whether to sail outside all obstructions or to proceed through the broken ice inside the outer islands as being safer than to plough through the pack outside (275).

— A great disadvantage for Labrador is the dependence of coastal shipping

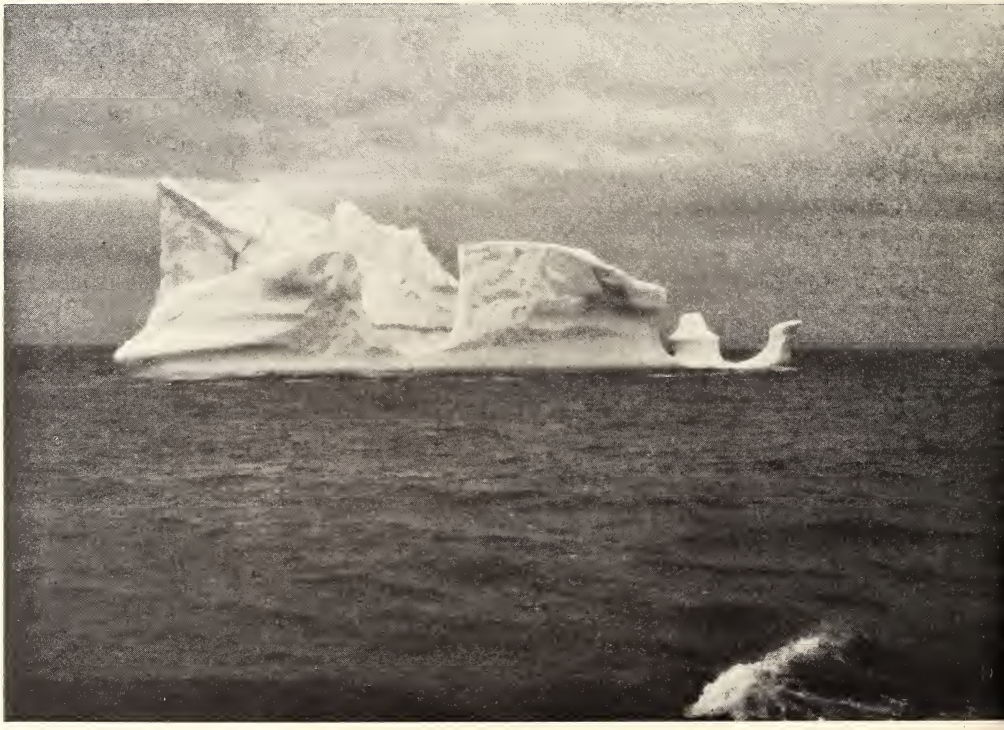


Fig. 138. Iceberg in the Labrador Current (536a).

on the occurrence of pack-ice which varies so much from year to year. It has happened that in the middle of July even the Straits of Belle Isle are blocked by ice. And in cold summers one must be prepared to meet pack-ice at any time up in the northern parts of the coast.

The Icebergs.

Seen from the air the huge icebergs, shining in white-greenish splendour against the deep blue sea, are a beautiful sight; Figs 138 and 139. For the

navigator they are less attractive. From a navigational point of view they are quite different from the pack ice, because there is always plenty of room to pass between them, they must, however, be watched for and avoided (275).

Gradually as the winter approaches the icebergs appear more rarely and finally disappear. Then they have frozen into the ice-belt blocking the northern coasts in winter. But when the ice-fringe begins to break up again the bergs start to move afresh. In this way, as CURTIS stated already in 1774 (196), the appearance of moving icebergs along the coast is for the natives a token of the approach of summer. The number of icebergs increases as the spring progresses upwards along the coast, and they float in nearer to the land, even the great, cube-like or tabular bergs, and their frequency attains its maximum during the period June—August on the Labrador coast. The current in which the icebergs float always proceeds south-south-east along the coast away towards Newfoundland. At the northern end of this the current separates. The branch current entering the Gulf of St. Lawrence through the Straits of Belle Isle is sometimes laden with icebergs which may be carried as far as the easterly point of Anticosti. The greater branch current continues in the former direction and carries the bergs with it to the Grand Banks, where some of them become stranded and melt away out on the banks, while others, caught in the warm North Atlantic stream, are borne out to the ocean where they also gradually melt away.

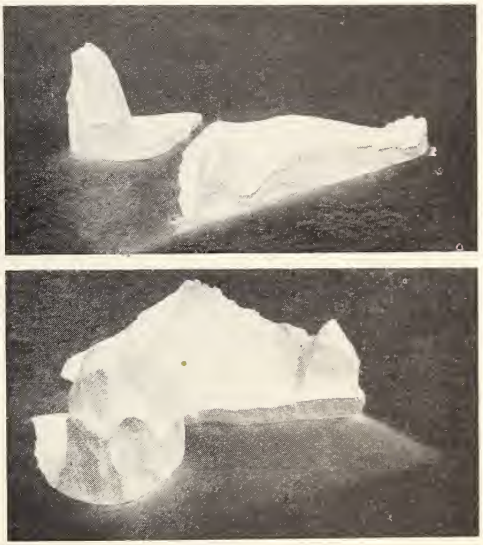


Fig. 139. Iceberg, some 70 m high, with flooded platform, eastward off St. Anthony, Newfoundland. This pinnacled type has probably arisen from a tabular berg by the erosive effect of the winds and the breakers. Aerophoto the author, July 4th, 1939.

The ICE PATROL of the United States Coast-Guard (976) has made extensive studies of iceberg frequency in the North Atlantic (cf. also 629). The number of icebergs varies very much; in 1912 the ICE PATROL reckoned 1200 bergs south from Newfoundland, in 1924 only 11. The unusual absence of field-ice in 1924 left the season's crop of bergs stranded in northern waters. BAYFIELD (48 b) stated

that in August one year he saw 200 icebergs in the Straits of Belle Isle, while in another year in the same month he observed no more than half a dozen (434). The frequency of icebergs has been thought to vary with meteorological causes, of which the connections are not yet by any means fully known.

The huge, tabular icebergs are, in the writer's experience, relatively rare on the Labrador coast. The greater bergs are here mostly of the residual type shown in Figs 139 and 140: from a level platform, invisible from a ship at a distance because it is one or two meters below the sea, the berg rises with



Fig. 140. A stranded iceberg. Two ice-stacks rise from a platform over which the water flows and which has probably been eroded from a tabular iceberg by the breakers. These stacks are continuously disaggregating because of the undercutting of the sea and the melting caused by rain and wind; the small blocks of ice rolling in the surf are witnesses of this. Photo FORBES-GRENFELL EXPEDITION, 1931.

cupolas, pinnacles, etc. This is due to the fact that whereas the icy polar water protects the deeper parts of the berg from melting action, the winds and rains are constantly attacking and disaggregating the ice showing above the surface of the sea. For this reason also it may happen that several bergs seemingly rise from one platform. Many of these bergs have no doubt arisen from tabular bergs by the erosion effect of the winds in the same way as the Coastal Range of Torngak Mts have come into existence by river erosion from the Palaeic peneplain. The most fantastic forms may arise in the melting of the greater bergs: often one can imagine one is looking at an architectural

masterpiece, floating dimly along with its magnificent steeples and pointed ogival arches. The heights are sometimes considerable; Stosch (903) measured one iceberg 79 m in height, while most of the others were between 30 and 40 m high; he was fascinated by their artistic shapes; he considered they could often be compared to small Gothic cathedrals. On stranded icebergs, too, one can discover the most curious forms; a mushroom-like shape may arise from the eroding influence of the superficial, relatively warm land-drainage layer of the sea. The small bergs seem to be lumps broken off from the larger ones and are not distinguished by regular forms; Fig. 140. The classic rule that nine times the height of an iceberg is below the surface of the sea holds good only very exceptionally. Stranded icebergs are found on dry land; in that case the platform has pushed its edge up over the shore and this would not have been possible if the old rule had been correct in such cases. Stranded icebergs often remain for years away in the north and are used as temporary landmarks.

The movement and proximity of the icebergs and the pack-ice drift are determined by the current and the wind. It may be said that at the Labrador coast the courses of the bergs are practically entirely controlled by the subsurface ocean current; at times the bergs may be seen sailing in storm with considerable speed against the wind. The tracks therefore can be fairly well followed or predicted from a current map with isobathic surfaces (cf. p. 259). Between the same isobaths the frequency of the icebergs is found to be somewhat similar. If the isobaths are closer together it implies that the speed of the current is increased there, and this is expressed by the grinding and breaking-up of the icedrifts as in a crushing machine. The reason for this is in many cases difficult to determine, esperially in Labrador, where reliable maps are lacking. On the other hand, from the frequency of icebergs, e. g. off Cape Harrison and Port Manvers where they are usually larger in size and number than in other places on the coast, the conclusion may be drawn that the isobaths here are locally pressed in towards the coast, presumably because of the bottom topography, and that the area of the currents cross section has been greatly restricted.

The belts within which the icebergs drive southwards are generally even in width and do not vary much from a course about parallel with the coast, as theory demands. If open water is formed for one reason or another between two isolines, it remains so also farther south, and is helpful to navigation. As the addition of meltwater from the land pushes the ice farther out to sea, large areas arise near the land quite ice-free and in these navigation can begin. But a wind that does not follow the isolines must naturally to some extent

affect the conditions and carry the ice away from the regular routes and in this way the fairway can be closed again. From this we can understand how difficult it is to generalize the scattered information obtainable regarding the disappearance of the ice from the coast.

The icebergs form a reservoir of fresh water: one has only to climb upon an iceberg and fill a pot from a pool made by the sun to have fine, fresh water to drink. This is quite without risk if done in the daytime. BARNES' (42) special observations of icebergs showed that the greatest amount of cracking and calving took place at and immediately after sunrise. During the night when the surface froze over, and during the day when it ran with water and the surface temperature was maintained steadily at 0° C, conditions were comparatively stable. Only when the temperature is changing is there good reason to be careful. Then the bergs split, the roaring is like that of an aerial bombardment and waves 6—10 m high swell up; this is frequently to be seen and heard at Port Manvers in the mornings. No wonder such waves can swamp a boat.

The icebergs combined with the pack-ice are often dangerous obstacles for coastal traffic. A great deal of experience is required to navigate, especially a sailing vessel, even on the Labrador coast where the icebergs are comparatively few. Many inexperienced sailors can believe they are sailing in between two bergs with plenty of room for their boat and not until it is too late do they discover that the bergs are connected below the water. One need only run the ship into a big, flat pan of ice or into the invisible platform between two pinnacled icebergs and the vessel would be damaged below the water, the bottom is ripped up by the ice and there is nothing to be done but to save the provisions. If one strikes on the weather of an iceberg some 60 m high and a quarter of a mile long, it will be an anxious half-hour before one can beat clear of it; if one strikes it the gunwhales of the boat will be broken and the vessel will soon be full of water: one will be gone and forgotten (cf. 862). Not only for fun did the early navigators of these waters designate Belle Isle the Isle of Demons. Yet, if the weather is clear a good steersman can clear them even in the night, for the outlines of the bergs appear with a faint, phosphorescent light against the black background (903). But when there is fog and many bergs, as e.g. in 1939, it is wiser to be very careful. The breakers which arise as the surf beats on the shores, can be heard at a great distance even in the densest fog, but when there is no wind not much is heard of the splashing of the waves against the bergs.

Captain BARTLETT, the old sea veteran, gives a vivid picture (45 b): Then came the fog, with light northerly wind, which brought us into loose ice and many bergs on the shoal ground. Fog and swell, with hardly any wind, make unpleasant conditions in these grim latitudes: it is astonishing that the rigging can stand the strain in the heavy rolling. Sometimes the curent and swell seem to drag you into the cold, stark walls of ice. Many vessels have worked off a lee shore, only to run foul of a berg. If you strike a berg, a shower of loose ice, some

of its pieces weighing tons, can fall from it, slide free and then hurtle down to disappear under the surface and then bob up again with tremendous force. The greenish-white bergs sink into the sea and surge up mightily again and are fearsome when you try to weather them. Had one of them struck the boat it would have gone right on through. — As the berg rolls one can fear that the surf will lift the boat clean out of the water. More than a few ships in berg-infested waters have perished that way. — It is very unpleasant for a ship dependent on sail alone; on several occasions in the dark and fog they have to carry full sail to get steerage way in the light air, and any smash would stove a hole in the vessel. You must keep headway so that you can steer. 'I guess' — said BARTLETT, 'the best thing is just to sail, keep a good lookout, and pray'. — However, the falling tide carries the craft far off shore again, and if the south-wester is strong enough, it clears the coast of ice, giving a chance to work farther north.



Fig. 141. Boulder barricades along the northern shore of Hamilton Inlet. Looking toward the east from the slope north of the entrance to Double Mer. Photo the author, July 14th, 1937.

The tides and local currents.

To these difficulties for the navigation is added the many effects of the tide. The local tide conditions have been studied specially by WILLIAM BELL DAWSON of the CANADIAN HYDROGRAPHICAL OFFICE.

The general run of the tide current may be parallel to the shores. The tide in e.g. Gready always runs south (275). Already in 1792 BERNARD (62)

reported that the tide current set southward along the coast with a speed of 1.2 miles an hour. But in the sounds it may reach 3 knots (382 a) and in several harbours the tide rises 7 feet (62). However, there are indraughts to all bays and bights; in Hamilton Inlet — Lake Melville, for instance, the tide runs 135 miles inland.

It was curious in the summer of 1937 at the mouth of the Hebron Fiord to watch the movement of an enormous tabular iceberg which, like a float, regularly registered the tide current: as the sea rose, it moved some kilometres into the fiord, only to return to the mouth as the tide fell; cf. Fig. 142.

The times of high and low water — within a few minutes (Halifax minus 43 minutes) — and the local amplitude of the tide — with a few tenths of a foot — are generally given in the 'Tide Tables, Atlantic Coast of Canada, 1929' (479). The amplitude for spring and neap tides respectively are as follows:

Chateau Bay	4	feet	and	2 ½	feet
Rigolet	5 ½	»	»	4	»
Epinette Point (Lake Melville)	2 ½	»	»	1 ½	»
Indian Harbour	6 ½	»	»	4 1/3	»
Nain	6 ½	»	»	4	»
Cape Chidley	19	»	»	14 ½	»

The amplitude thus rises fairly regularly towards the north. But there are anomalies: at Seaplane Cove the tide is never recorded as greater than about 4 feet (692), at Kangalaksiorvik 5 feet is recorded, whereas 40 miles further north at Ekartiarsuk a tidal range of 8 feet has been observed; the difference may be accounted for by the nearness of the station to Ungava Bay, where the tides are reported to have an average range of 19 feet at Port Burwell (275).

The two diurnal tides on the northern Atlantic coast are of very unequal magnitude, the difference at times amounting to more than 2 feet (157, 692).

The amplitude of the tide is still further increased at Ungava Bay by the geographical conditions. Kohlmeister and Kmoch (530) a century ago reported that the tide at Killinek rose 4 fathoms. Mrs. Hubbard (458) reports a 50-feet spring flood in Ungava Bay. Flaherty too tells (265) of the 60-foot tide, one of the highest in the world. At Fort Chimo different sources give the amplitude of the tide as varying between 60 and 45 feet at the spring flood, i.e. up to about 19 m, one of the greatest known on the earth; according to another source (799), the amplitude is 12 m. Another note (965) gives the spring tide at the mouth of the Koksoak River as reaching 62 feet. In the

estuary of the George River the tide is said to rise 53 feet at the mouth and 42 feet at Fort George (965). At George River Post the rise and fall of tide is forty feet; in Ungava Bay and straits it has a record of sixty-two feet rise at flood, with the spring tide (995). On the other hand the tidal range of the Labrador coast of Hudson Bay is only 12—18 feet (173).



Fig. 142. The line of demarcation showing the meeting of inland and ocean waters near the mouth of Hamilton Inlet. Photo FORBES-GRENFELL EXPEDITION, 1931.

The tremendous tidal indraught causes local currents of great violence and the sea penetrates inland a good distance. Even a century ago DAVIES (208 a) stated that navigation in Ungava Bay is peculiarly difficult and dangerous owing to the great violence of the currents, which in many cases have the velocity of a rapid and are aided by the strength of a tide that rises up-

wards of 60 feet measured perpendicularly, as at Fort Chimo 28 miles from the sea. Ungava Bay (the Eskimo word means 'the bay beyond [the Torngaks])' presents in this respect a great contrast to the coast fronting the Atlantic, where the rise seldom exceeds 8 feet. The difference, DAVIES wrote, may be accounted for by the fact that this bay lies at the mouth of the Straits and is open to the north, so that the strong current known to set out from Hudson Strait along the coast of Labrador rushes directly into Ungava Bay, thus causing the prodigious rise of the tides and the numerous eddies and currents met with in every part of the shallow bay. The mouth of the Payne River is a rather wide valley where LOW was able to navigate his 35-foot yacht for some 25 miles at high tide; it flows with such rapidity through the gorge-like passage connecting Leaf Gulf with Ungava Bay that very dangerous m a e l s t r o m s occur; the natives, except at the change of tide, never venture there (265). In the estuary of the Leaf River is a lake, Tasi'iyak where the tremendous energy of the tide gives rise to the most violent currents and whirlpools. On the Koksoak River the head of the tide is 50 miles from the sea. The river mouth forms a true estuary, 2—5 miles wide and some 300 feet deep. On the Whale River the head of the tide is 8 miles above the coastline, and on the George River nearly 30 miles, while the valley near the mouth is 2—3 miles wide (174). The tidal indraught makes navigation in many of these contracted channels exceedingly difficult. Ships unloading at Fort Chimo are compelled by the great amplitude to go out when the tide begins to fall and anchor some 20 miles away, returning again with the rising tide to finish their work.

On the other hand, at low tide the sea retreats for many miles. The broad, inter-tidal zone which appears quite flat to the eye is sprinkled with erratic boulders and with ponds, some of which are of considerable depth here and there. On these flats I was told that the high tide shore varies considerably with the strength and direction of the wind too: a strong sea-wind will push the shore line inland, and a land breeze will hold the flood-tide to seaward. Cruising is therefore most difficult and such conditions make special demands on a navigator's skill not to run aground as the tide falls, for then his vessel will be filled with water when the tide rises. It is necessary to know the coast well to reach safe camping-ground where it is also easy to re-embark. Some years ago the schooner *'Fort James'* was in Ungava Bay and stood on the crest of a reef as the water began to fall; at ebb-tide the bow lay 1.5 miles from the low water line. The schooner *'Dorothy Snow'*, which had carefully sounded the depth before she cast anchor found herself at ebb tide lying in a little isolated pool miles away from the low water line; she managed however

to avoid grounding and upsetting; if this latter occurs the boat may be lost. Commander MacMillan, perhaps one of the most experienced skippers in these waters, told me in the autumn of 1937 that he had experienced a similar misfortune that very summer in one of Baffin Land's fiords just opposite Resolution Island. The local tide was enormous at that place and as it fell his schooner ran aground and lay on its side. When later the sea began to rise quickly the water forced its way in through the closets and began to fill the boat. Only after very hard work at the pumps could the boat be floated and got on its keel again.

The currents due to the tidal water reach their greatest speed in certain narrow sounds. One of these lying between the most north-easterly cape of the peninsula and Killinek Island, is called Ikkerasak (an Eskimo name meaning passage) or McLelan Strait, also Grenfell Tickle, and measures 0.2—1.0 km in width (in one place only 0.15 km) and 23 km in length; cf. Fig. 32. Here is a very rapid tidal current. As the tide in the north-west on the Port Burwell side stands at 20 feet, but at the Atlantic mouth of the sound at only 10 feet, there arises a gradient current which in half an hour can reach a speed of 10 knots and possibly more. Not even during the most severe winter does this sound freeze completely. Also in the other narrow bays in this tract extremely powerful currents and whirlpools arise which irresistibly drive a boat round towards the eddying centre where the thin scales of ice and the drift wood dance together. If storm also arises the danger of being crushed against the rocks is very great for small boats; the speed can be as great as that of a railway train, says Hantsch (400). — It was in these districts that Davis' »furious overfall» was found (210) which is repeated in the literature of the 17th century and later (530).

As has been said the tides are of no great size at the Atlantic coast, but they are sufficient to produce strong tidal currents in the archipelagos and channels of different orders: runs, tickles and rattles. The 'rattles' are of particular interest; for instance, just north from Davis Inlet and in the Manvers Run — Fig. 143 —, they are narrow passages, in which the tide runs so fast that it makes a noise (275). In the channels in the Nain archipelago numerous eddies with 'rattles' are formed, e.g. in Strathcona Run; Fig. 20 a. With a speed as great as if it had been steered down a strong rapid our motor-boat advanced with the incoming tide up into the flat lakes in the Fraser River far inland. In the contracted part of Double Mer the current reaches 4 knots. The Narrows between Hamilton Inlet and Lake Melville show the stream at 4—5 knots but it can reach more than 9 knots, for our vessel had this speed and it could not always get up this falling current until this had been levelled out.



Fig. 143. Looking south-west through Manvers Run from over Mt Thoresby. The 'rattle', where the tide runs so fast that it is audible, is by the steep cliff in the centre of the picture. The wide sheet of water in the distance is Webb's Bay. Compare with Fig. 105. Aug. 1932 (275).

Grenfell (381) said that in Sandwich Bay between the south point and the big wooded island only a stone's throw across there is just such a tidal current. It twisted his steamer almost completely round when it was steaming 9 knots. In such places one is obliged to arrange journeys according to the tide, choosing as a rule to travel in with the rising water. It is in many cases not possible to make headway against the stream even with a strong motor.

The t i d e-r i p — the short, choppy waves which arise in narrows where the tide bulge meets the storm waves or swell — can be very dangerous for open boats, filling and capsizing them. When there is a storm, the tide-rip is high and one soon learns to know what it is to be storm-tossed and weary. The boat dances and throbs, one is drenched with rain and spray. There is probably thick fog and one sees nothing but tumbling waters high as houses and hears nothing but the roar of the waves. As daylight wanes the wind usually falls but the swell continues. One must pity anyone who is inclined to seasickness and must sail these waters (472). MacLelan Straits show the most treacherous tide-rip in the constrictions of its tortuous channel.

When the ill-known Labrador fog (of this more later) is added to the local currents and the drifting ice, both experience and no little watchfulness and skill are demanded of the skipper if he is to win through with his boat and a whole skin. I myself many a time had my heart in my mouth as under the guidance of my Eskimo pilot Julius Nathanael of Nain we skirted danger in the archipelago with its submerged rocks and currents.

In countries where there is always a winter-ice sheet and the tide is considerable, connected, so-called b o u l d e r b a r r i c a d e s, Fig. 141, are formed. This happens in Labrador also (200, 1061, 1021, 917). Their method of formation I have recorded earlier (917). These boulder barricades give an indication both of the extent of the bay-ice sheet and of the limit of the tide in the bays, because the barricades are lacking where the bay has been ice-covered but the tide is unremarkable.

Part III. The meteorology and climate.

Some general considerations concerning the climatic features of Labrador.

To obtain a general picture of the weather conditions in Labrador it should be borne in mind that this country is the scene of struggle between two complexes of climatic activity: the continental complex of the inner regions with rainfall in summer and cold winters, and the maritime of the seaboard with rain in autumn and winter and comparatively milder winters. The continental climatic conditions prevail over the entire peninsula in winter, whereas in summer the maritime type of climate greatly influences also the interior. Moreover, the climate of Labrador, lying west of the North Atlantic, corresponds in so far with that of Fennoscandia on its eastern side that the fundamental climatic features of both are normally conditioned by the two centres of atmospheric action over the North Atlantic, viz. the low pressure south of Iceland and the high pressure zone of the Northern Atlantic. From the cooperation of these and the other sources of climatic action the most complicated effects arise. When at the beginning of the summer the sun rises higher towards its zenith the high pressure above the Atlantic recedes somewhat further northwards. As a result, warm currents of air laden with humidity sweep from the south and south-west over the eastern border of North America, including the Labrador peninsula. This influence is strongest at the height of summer, when the difference in pressure between the Atlantic centres has been to a great extent levelled out and the high pressure zone has a chance to expand. Yet this difference can be so levelled out that calm prevails. Under such conditions a local low pressure may even arise on Labrador which has been heated during the summer and sucks in air both from the ocean and Hudson Bay, and then comparatively abundant rain may occur. We shall take another instance: the distribution of air pressure in winter on the North American continent contributes in a high degree to the stabilisation of the continental type of climate on Labrador; between the permanent high pressure in the north-western interior of Canada and the low pressure on the northern Atlantic arises a strong baric gradient driving ice-cold, dry monsoon winds from the north-west or west across Labrador.

However, this system of ventilation is seldom the only determining weather and wind in Labrador. Several modifying factors, to a great extent dependent on the distribution of land and sea in the northern hemisphere, intervene in the struggle to a very great extent both locally and regionally. In the previous chapter it was shown that the Labrador Current is such a factor; it thrusts a new type of climate — the inhospitable arctic maritime climate — southwards like a wedge between the spheres of the continental and the oceanic climates. Another incalculable source of disturbance affecting the combination of the fundamental climatic features and sometimes radically disarranging it are the so-called moving cyclones. These may attack the peninsula from the south-west, south-east or even the north-east and cause almost all the irregular changes in the weather from day to day.

The Atlantic coast of Labrador and its hinterland will therefore especially in summer have an intermediary position climatically characterized by exceedingly unstable weather: abundant rain and sunshine succeed each other several times a day, and now and then violent thunder-storms cross the coastal regions — a fact clearly brought home to the Expedition from Finland in 1937. A period of calm weather lasting more than 24 hours is rare on Labrador.

The character of the climate of a place thus considerably varies with its geographical position. The regions some distance from the shore are more subjected to radiation of heat, they have warmer summers but colder winters, they form a transition to the true continental type; North West River is such a transitional station. On the other hand, the places at the coast are always cooler in summer and have a slighter annual thermic range; in summer and autumn they represent somewhat the oceanic type of climate.

All this shows that the Labrador climate is the integral of a number of variables every one of which varies within wide limits. It is well to bear in the mind these considerations when we now proceed to study the different climatic elements constituting the climate and weather of Labrador.

The available meteorological records.

Observations are available only from the few meteorological stations in Labrador where journals have been regularly kept for varying periods. These stations are: Fort Chimo (1882—1919) (1919 . . . 1932) and Belle Isle (1882. . . 1934), the Moravian Missions stations at Ramah (1872. . . . 1889, 14 years), Hebron (1883...1902), Okkak (1776 . . . 1889, 9 years), r. Nain (1883...1902), r. Zoar (1883...1902) and r. Hopedale (1883...1902) (1867...1874). The last three stations are seemingly reduced to the series Hebron 1883...1902. In

TEMPERATURE AND PRECIPITATION IN LABRADOR AND ITS SUR-

	Harrington		Belle Isle	Rigolet	Hopedale	
Stations:						
Latitude N.	50° 32′		51° 53′	54° 8′	55° 27′	
Longitude W.	59° 30′		55° 22′	57° 12′	60° 12′	
Elevation m	9 m		133 m	c:a 10 m	8 m	
Years	1911—1915	1915—1933	1882...1934	XI. 1857—VI. 1859 VII. 1860—VI. 1863 (3—4 years)	r. 1863—1902	1867—1874
Temperature, °C						
January	— 14.2°	— 13.3°	— 12.8°	— 18.4°	— 20.1°	— 22.7°
February	— 13.1°	— 12.6°	— 12.3°	— 16.4°	— 17.1°	— 18.1°
March	— 6.4°	— 7.0°	— 7.7°	— 9.1°	— 12.0°	— 12.7°
April	— 2.8°	— 0.9°	— 2.6°	— 2.9°	— 4.6°	— 5.2°
May	+ 3.1°	+ 3.3°	+ 1.2°	+ 1.3°	+ 0.6°	+ 0.1°
June	+ 7.7°	+ 7.4°	+ 5.3°	+ 5.3°	+ 5.2°	+ 5.1°
July	+ 11.4°	+ 11.8°	+ 9.3°	+ 10.9°	+ 10.4°	+ 9.6°
August	+ 12.3°	+ 12.2°	+ 10.4°	+ 10.5°	+ 10.4°	+ 9.7°
September	+ 9.1°	+ 8.7°	+ 7.6°	+ 5.4°	+ 6.5°	+ 5.9°
October	+ 4.4°	+ 3.7°	+ 2.8°	+ 0.1°	+ 1.0°	+ 0.7°
November	— 2.2°	— 2.1°	— 2.6°	— 5.6°	— 6.3°	— 4.5°
December	— 8.9°	— 8.4°	— 9.8°	— 15.1°	— 15.1°	— 17.0°
Year	+ 0.1°	+ 0.2°	— 0.9°	— 2.8°	— 3.4°	— 4.1°
Range	26.5°	25.5°	23.2°	29.3°	30.5°	32.4°
Average annual extremes, °C						
Maximum	—	+ 20.8°	+ 18.9°	—	+ 25.3°	—
Minimum	—	— 32.2°	— 29.8°	—	— 35.3°	—
Precipitation, mm			(1886-1933)			
January	67	62	48	—	—	—
February	53	57	50	—	—	—
March	46	43	78	—	—	—
April	45	29	67	—	—	—
May	68	41	68	—	—	—
June	61	49	125	—	—	—
July	84	62	122	—	—	—
August	95	69	131	—	—	—
September	45	47	134	—	—	—
October	83	66	136	—	—	—
November	51	42	90	—	—	—
December	33	51	53	—	—	—
Year	733	619	1100	—	—	—
Extreme early amount in mm.						
Maximum	1000	1000 (1913)	—	—	—	—
Minimum	550	380 (1924)	—	—	—	—
Climatic type	Dfc		Dfc	Dfc	Dfc	

ROUNDINGS. Station Rigolet from HANN (398 a), the others from CONNOR (169).

Zoar	Nain	Okkak	Hebron	Ramah	Resolution Isl.	Chimo	Mistassini Post
56° 7′	56° 33′	57° 34′	58° 12′	58° 53′	61° 18′	58° 10′	50° 30′
61° 22′	61° 40′	62° 3′	62° 37′	62° 21′	64° 53′	68° 10′	73° 55′
10 m	4 m	c:a 5 m	15 m	3 m	39 m	15 m	386 m
r. 1883—1902	r. 1883—1902	1776...1889 (9 years)	1883—1902	1872 ..1889 (14 years)		1919—1932	
— 22.0°	— 21.5°	— 19.6°	— 20.9°	— 21.0°	— 19.3°	— 24.7°	— 20.9°
— 18.9°	— 19.0°	— 20.8°	— 19.2°	— 21.3°	— 19.9°	— 23.1°	— 19.1°
— 13.6°	— 13.8°	— 14.9°	— 14.4°	— 15.6°	— 13.9°	— 16.5°	— 10.0°
— 5.4°	— 6.0°	— 6.4°	— 6.6°	— 7.0°	— 9.2°	— 7.1°	— 1.8°
+ 0.6°	— 0.2°	+ 0.1°	— 0.4°	— 0.4°	— 2.1°	+ 1.8°	+ 5.6°
+ 5.5°	+ 4.5°	+ 4.7°	+ 4.5°	+ 4.4°	+ 1.1°	+ 8.4°	+ 12.5°
+ 10.9°	+ 8.9°	+ 8.3°	+ 8.2°	+ 8.2°	+ 3.7°	+ 10.6°	+ 15.8°
+ 10.4°	+ 9.1°	+ 8.7°	+ 8.4°	+ 8.1°	+ 5.1°	+ 12.3°	+ 13.9°
+ 6.2°	+ 5.3°	+ 4.9°	+ 4.3°	+ 4.4°	+ 2.9°	+ 6.6°	+ 9.1°
+ 0.3°	— 0.1°	— 0.9°	— 0.7°	— 0.5°	— 1.2°	— 0.3°	+ 2.8°
— 7.7°	— 7.8°	— 7.0°	— 7.4°	— 6.5°	— 6.3°	— 7.6°	— 6.0°
— 17.3°	— 16.8°	— 16.4°	— 16.0°	— 16.4°	— 14.2°	— 17.8°	— 16.1°
— 4.2°	— 4.8°	— 4.9°	— 5.0°	— 5.2°	— 6.1°	— 4.8°	— 1.2°
32.9°	30.6°	29.5°	29.3°	29.5°	25.0°	37.0°	36.7°
—	+ 24.8°	—	+ 26.9°	+ 23.3°	—	+ 31.3°	+ 29.7°
—	— 35.4°	—	— 36.5°	— 34.4°	—	— 37.8°	— 45.4°
			(1883-1891)	(1882-1889)			
—	—	—	24	23	30	—	48
—	—	—	13	32	37	—	44
—	—	—	22	32	25	—	48
—	—	—	30	62	32	—	43
—	—	—	39	29	40	—	63
—	—	—	53	51	36	—	82
—	—	—	58	52	61	—	98
—	—	—	70	64	46	—	95
—	—	—	84	71	54	—	100
—	—	—	43	70	22	—	75
—	—	—	28	74	34	—	72
—	—	—	17	49	42	—	58
—	—	—	481	609	457	—	829
—	—	—	780 (1887)	—	—	—	1030 (1924)
—	—	—	260 (1884)	—	—	—	510 (1920)
ET	ET	ET	ET	ET	ET	Dfc	Dfc

view of the great area of the country (nearly 300,000 sq. km) these eight stations, all situated on the seaboard, cannot provide an exhaustive record of the Newfoundland-Labrador climate. Moreover, the observation series from the different stations are for only a few years, and only for a few of the stations (cf. the tables on p. 290 sq.) are comparable series obtainable. It is true that some meteorological observations, made by travellers and others, are available from the interior also, but unfortunately those observers have changed their positions almost daily, as for instance Low and Eaton (239 a), Mrs Hubbard (458), Wallace (995), and their notes therefore give merely a sporadic connection with the most important posts where systematic observations have been made. The same applies to some short series, for instance those of Bowes (523) for the interior part of Lake Melville, of Moore (469) concerning Cartwright, and of Coleman (157) concerning Nachvak. It is obvious that such observations are interesting though they concern places far removed from the regularly managed station; they give a rough idea of the differences. Yet, it is generally not possible to reduce all these rough observations to comparable, normal series. Roughly speaking they seem to give the same picture as those of the regularly observed stations, though there are differences in detail.

The figures for the principal meteorological elements in the above tables must therefore not be looked upon as absolutely conclusive for these stations, principally because considerable departures from the mean values are fairly frequent.

A study made by Prof. Osc. V. Johansson of for instance the temperature differences helps to explain the inexactness of the above figures.

	J	F	M	A	M	J	J	A	S	O	N	D	year
Hebron—Chimo	3.8	3.9	2.1	0.5	−2.2	−3.9	−2.4	−3.9	−2.3	−0.2	0.2	1.8	−0.2
Nain—Hebron	−6	2	6	6	2	0	7	7	10	6	−4	−8	2
» —Okkak	−1.9	1.8	11	4	−3	−2	6	4	4	8	−8	−4	1
» —Zoar	5	−1	−4	6	8	10	20	13	9	4	1	−5	6
» —Hopedale	−1.4	−1.9	−1.8	−1.4	−8	−7	−15	−13	−12	−11	−15	−17	−14
Belle Isle— »	7.3	−4.8	−4.3	−2	6	1	−11	0	11	8	37	53	25
» —St. John's	-8.1	−6.7	−5.3	−4.3	−5.0	−5.5	−5.8	−5.1	−45	−46	−5.5	−82	−57

By adjustment it is found that as regards the comparability the uncertainty is about 1° for Chimo for the summer, and for Okkak still greater for the winter. Even in the deteriorations occurring in the series which have been reduced to the same period (83—02), e.g. Nain-Hebron, the uncertainties occur.

It is not a matter of surprise that there are slight divergencies in the average figures published by different authors; this is generally due to the

unequal length of the different series they used for the same station. Thus, for instance, it is not surprising that HANN (1896) and CONNOR (1938) found the maximum temperature was in August, DÖLL (1937), on the other hand, in July. DÖLL found that in 11 years the mean temperature reached its highest point at the southern stations in July, and in 9 years in August, while in Hebron the maximum point was reached in August in 11 years and in July in 9 years. However, the difference (table above) between these months practically = 0 and both months are thus essentially equally warm. CONNOR's results appear to me conclusive.

Strictly speaking, the figures are temporary and approximate. However, when the observations from the meteorological stations in the surrounding areas are included the network gives a rough but fairly enlightening picture of the meteorological conditions on Newfoundland-Labrador.

Temperature.

The temperature conditions of the country are shown on the above table, based upon the mean monthly temperatures observed (cf. 169). In view of the small number of stations with regular records, 3 (7), some outside stations have been included: for the Straits of Belle Isle coast the station Belle Isle, for the Gulf coast the station Harrington, for the northernmost part of the country the stations Resolution Island and Chimo, and for the interior Mistassini.

A comprehensive view of the geographical distribution of the sea level temperature may be obtained from the isotherms on the four following cartograms; Figs 144 and 145 (cf. 1). In January the south of Labrador has approximately the same temperature as south-west Greenland. In July, at the height of the growing season, even the northernmost Labrador coast is as warm as the west coast of the south of Greenland.

The yearly average temperature for the whole country is negative, varying from —2.8° at Rigolet and —5.2° at Ramah to the probably average in Killinek, some —6°, judging by the figure from Resolution Island, —6.1°.

The table shows how great are the changes in monthly temperature at each station as well as the differences between the stations and their average amplitude. Yet, great departures from the average figures have been noted. For instance, the absolute variation of the temperature during the twenty years, 1883—1902, was as follows (238):

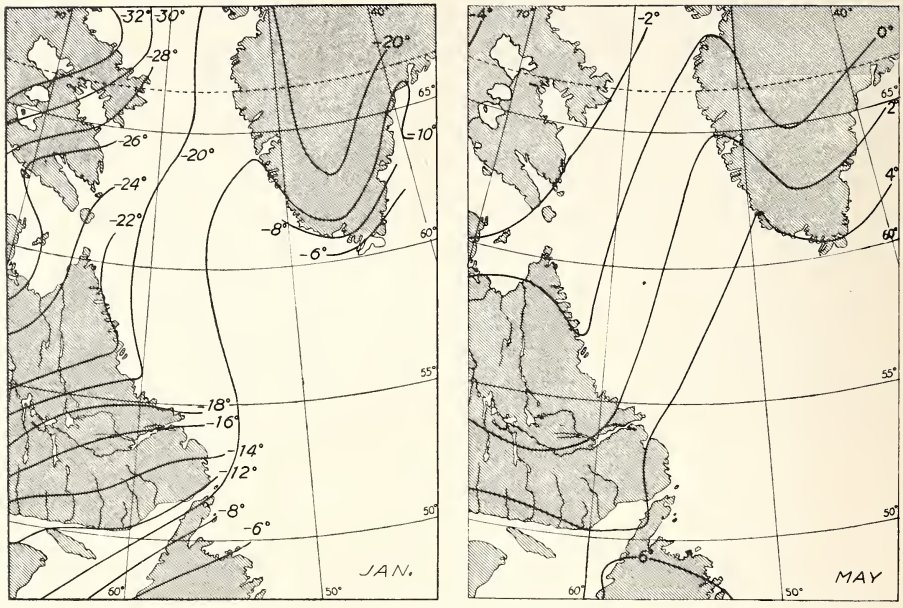


Fig. 144. The distribution in Newfoundland-Labrador and its surroundings of the monthly mean sea level temperature in centigrades: January and May.

	Hopedale	Zoar	Nain	Hebron
absolute max.	28.7° (1890)	27.3° (1902)	27.3° (1902)	30.8° (1897)
» min.	—38.0° (1888-1889)	—38.9° (1884)	—38.1° (1884, 1887)	—41.0° (1889)
highest annual average	— 1.2° (1892)	— 1.8° (1892)	— 2.5° (1901)	— 2.5° (1892)
lowest annual average	— 5.1° (1884)	— 5.9° (1884)	— 6.4° (1884)	— 7.0° (1884)
amplitude	3.9°	4.1°	3.9°	4.5°

Taking into consideration what has been said above about even the average values based upon the series of many years it is obvious that the extreme figures must be so much the more inexact.

The variations of the yearly range found for the same period are also considerable:

	Hopedale	Zoar	Nain	Hebron
smallest	28.3° (1888)	28.5° (1892)	27.9° (1895)	25.7° (1895)
greatest	38.0° (1890)	40.7° (1890)	38.3° (1890)	35.5° (1891)

In order to give a general survey of the annual variations of temperature, the monthly averages at Hebron as well as at the Canadian station Chimo

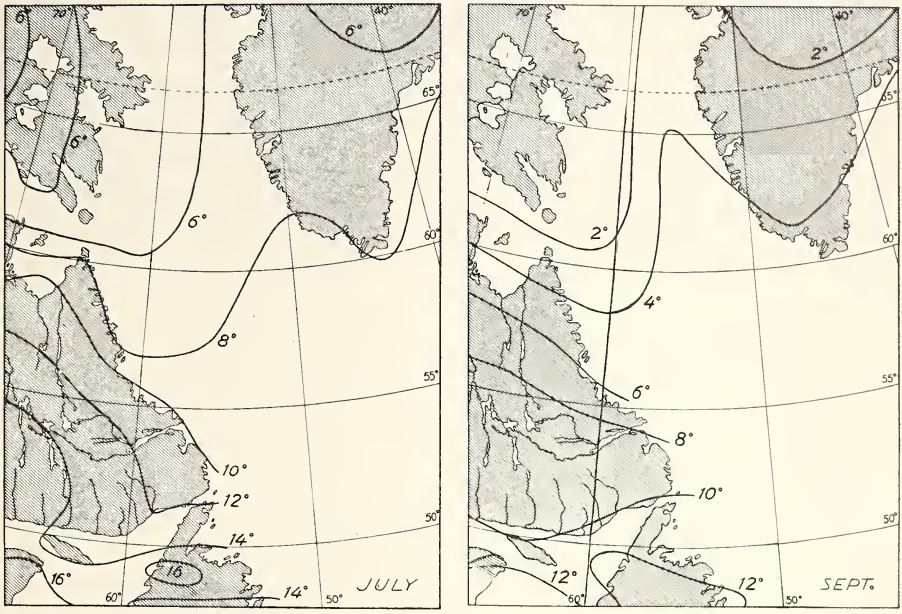


Fig. 145. The distribution in Newfoundland-Labrador and its surroundings of the monthly mean sea level temperature in centigrades: July and September.

have been plotted in Fig. 146. These stations have very nearly the same mean temperature; yet, there is a small but significant difference in the run of the temperature curve of the station situated at the Atlantic coast on the one hand, and at Chimo, south of Ungava Bay, on the other. At Chimo the winter is remarkably colder and the summer warmer than at the other stations, no doubt owing to their closeness to the sea and the Labrador Current, whereas Chimo is more inland. Along the northern part of the Labrador coast the temperature decreases but slightly, about 0.7° per 2 degrees of latitude (398 d), because the climate there is of a somewhat maritime character and evidently influenced by warmer air currents (of which more further on).

Less noteworthy is the difference between the stations Hebron and Nain. However, the former, closer to the ocean, has a somewhat higher winter temperature and lower summer temperature than Nain, which is more inland inside a fiord. The coastal station Hopedale, on the other hand, is warmer than Hebron and Nain both in winter and summer, owing to its more southern latitude, the solar radiation increasing considerably with decreasing latitude.

The high aperiodical (total) yearly mean temperature amplitude not only at Fort Chimo but also at all the Atlantic stations is very surprising: 69.1°

at Chimo, 63.4° at Hebron and 60.6° at Hopedale. The continentality index ($k = \frac{1.6\ A}{\sin \varphi} - 14$; see JOHANSSON in Acta Geographica, Vol. 2, no 1) in which the influence of φ has been eliminated, gives the best indication of the yearly run of the periodical amplitude, k being at Chimo 55 %, at Zoar 49 %, at Nain and Hopedale 45 %, at Ramah and Hebron 41 % [Thorshavn = 0 %, Verchojansk = 100 %] (cf. 498 a). Such amplitudes are characteristic of most stations in the interior of the continent. On the Labrador seaboard they are due to the fact that in winter the firm area of Labrador is regularly consi-

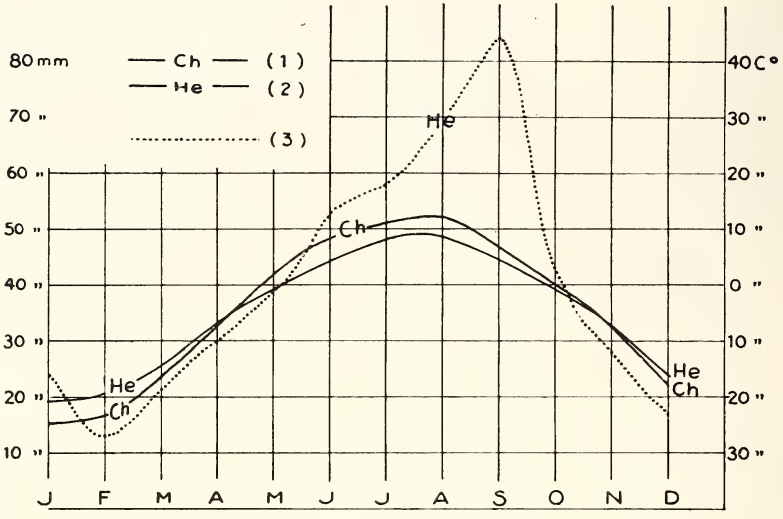


Fig. 146. 1 and 2. The variation of the monthly mean sea level temperature at Chimo (Ch) and Hebron (He). 3. The variation of the monthly mean precipitation at Hebron (He).

derably increased by the formation of ice in the surrounding seas, which gradually extends eastward the strong continental cooling by means of radiation of heat.

The summer temperatures along the coast are surprisingly low (cf. Figs 146 and 147), because after the slow disappearance of the winter ice, the shores are cut off from the oceanic influence of the Labrador Sea by the Labrador Current. A noticeable phenomenon in this respect is the run of the monthly average temperature curve of Belle Isle (cf. Fig. 147), which is situated in the very midst of the Labrador Current: from April to August the curve shows a small but notable drop probably due just to the cooling influence of this current and its ice-drift. This is also the reason why the warmest month in the

coastal region is not July as elsewhere in this latitude, but the maximum heat occurs later in August.

The effects of the sea's freezing and the ice drift on the air temperature are, however, sometimes weakened by the masses of warm air brought here by the cyclones. The moving cyclones in winter time are especially important in their effect. In North America they usually move from west to east, often with double their usual speed in Europe. When the cyclones pass towards the east with a relatively warm and humid, snow- or rain-bringing air mass in front but with icy-cold and gusty wind behind, it is said that the temperature can fall 20—30 degrees in a few hours at a place crossed by the cyclone, and the north-west wind behind can there reach a speed of 60—80 km an hour. It sometimes happens that the anticyclone of the Azores spreads out even in winter and approaches the coast of the New World, or even stretches some distance in over the shore, and the high pressure then shifts the paths of the moving cyclones more to the north than usual (cf. Figs. 53 & 54 in 169). Under such conditions Labrador's winter climate can be milder, and yet more snow than usual may fall. Moreover, the large cyclones are apt to send secondary depressions, 'secondaries', up to the northernmost part of the Labrador coast, where not infrequently they interrupt the winter frost for some days.

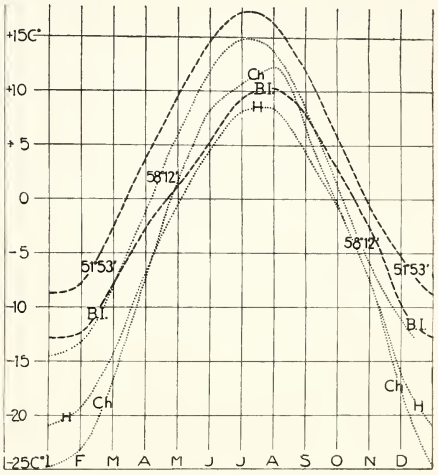


Fig. 147. The negative temperature anomalies of some Labrador stations. The upper thick curve indicates the variation of the normal temperature computed for the parallel, 51° 53′ N, at which latitude the station Belle Isle (B. I.) is situated; the lower thick curve shows the variation of the monthly mean temperatures of Belle Isle. The thin, stippled curves indicate the variations of the monthly mean temperature at the parallel 58° 12′ N, and the stations Hebron (He) and Chimo (Ch) respectively, which lie at practically this latitude.

This kind of 'heat-wave' which occurs in some years, especially in February, is very surprising; the most extreme case was in 1901 when the average temperature of the month in Nain was 14.5° and in Hebron 14.7° higher than the monthly average for the period 1883—1902. An abnormally high temperature prevailed also in December, 1878, when the average temperature at Ramah was —4.2° (398 c); the whole year 1878 was strikingly warm. In December also the

frequency of winds from the north to the east was 62 % against an average of 20 %, and of winds from the south-west to the north-west 15 % against an average of 54 %; the average air pressure was 749.9 mm against an average of 757.5 mm, the cloudiness 9.3 against an average of 5.5. To judge from these figures the anomalies must have been due to strong cyclonic activity. Rather similar conditions were observed in 1885 and 1902 (238). In those years when the Canadian anticyclone is weaker the anomalies due to the cyclones may extend their effects far into the land, and then they increase the temperature for a longer time in the winter. The cyclones also cause the temperature in Hebron to be very variable in winter (99). The winds mingle the air and in this way prevent the occurrence of very low or very high temperatures. It is said that if the air remains calm for a time the temperature can, because of the heat radiation, fall to 50° C and perhaps even lower in the interior of Labrador.

On the other hand, in some years 'cold-waves' have been observed in Labrador, even in July. This fall in the average temperature has then proved to be due to the fact that the warm land winds have had to give place to a frequency of oceanic winds from the north-east quadrant. This was the case in 1884; in Hopedale the winds from north to east were 89 % against an average of 39 %, the winds from south-west to north-west were 2 % against an average of 41 % and the calm 16 % against an average of 27 %. The air pressure was 760.1 mm against an average 755.7 mm. It is clear that a little area of high pressure had forced its way in from the north.

What we do not see from the average figures in the tables is that all stations may register days without frost in the winter months, and that, on the other hand, even the summer months may have a minimum temperature $<0°$ especially at night. — Night frosts in the summer time give much trouble to the missionaries in their gardens. In the spring they must be dug out of the snow, but even during the summer they must sometimes be covered with mats for many nights to protect them from the frost.

In studying the biological phenomena (822 a), as in characterizing the temperature conditions at a place (534 b), it is important to know the point of time when certain temperature limits are reached and the number of days when the temperature exceeds or is below a certain temperature. By means of a graphic computation according to Supan's method on the basis of the average yearly curve for the temperature 1883—1902, Döll (238) has calculated such data. Moreover this result seems to indicate rather late data.

Upon the figures in the above table, p. 290 sq., by means of a simple linear interpolation the following results are obtained:

	Temperature greater than 0° reached on	ended on	number of days above 0°	5° reached on	ended on	number of days above 5°	10° reached on	ended on	number of days above 10°
Belle Isle	6:V	31:X	178	13:VI	32:IX	111	35:VII	20:VIII	16
Hopedale	14:V	20:X	159	12:VI	23:IX	103	13:VII	19:VIII	37
Zoar	12:V	17:X	158	12:VI	21:IX	101	10:VII	18:VIII	39
Nain	19:V	15:X	149	18:VI	17:IX	91			
Hebron	18:V	11:X	146	19:VI	11:IX	84			
Chimo	9:V	2:X	146	—1:VI	28:IX	65	7:VII	28:VIII	52

These figures are in the spring about 11 days and in the autumn about 17 days earlier than DÖLL's data. In agreement with the above figures the duration of the thermal seasons in days is at:

	Winter, $< 0°$,	Spring, 0°—10°,	Summer, $> 10°$,	Autumn, 10°—0°.
Belle Isle	187	90	16	72
Hopedale	206	60	37	62
Zoar	207	59	39	60
Nain	216	[30] 149		
Hebron	219	[32]	146	
Chimo	219	59	52	35

Considering the rather southerly situation of Newfoundland-Labrador its thermal conditions seem surprisingly low. To illustrate this two stations at 57° N. may be taken for comparison:

	January	July	difference		January	July	difference
Nain	—21°.5	8°.9	31.1	Aberdeen	2°.9	14°.3	11°.4

In Fig. 147 have been plotted the mean monthly temperatures I have computed (cf. HOPFNER, Peterm. Mitt., Bd 52, p. 32, 1906) for the parallels 51° 53' N (the latitude of Belle Isle) and 58° 12' N the latitude of Hebron (Chimo being at 58° 10' N). A comparison of the mean monthly temperature curves for Belle Isle, Hebron and Chimo with the corresponding normal mean temperature curves for the corresponding latitudes shows the rate of departure from the latter, or the n e g a t i v e so-called t h e r m i c a n o m a l y o f L a b r a d o r. From this we can conclude that the negative anomaly increases in winter from something more than —4° at Belle Isle to something more than —6° at Hebron and —10° at Chimo. On the other hand in summer the anomaly is about —7° for Belle Isle and only —4° for Chimo, owing to the latter's more continental situation.

From HANN (Lehrb. V. 1937, p. 180) the following figures have been computed for the anomaly:

	φ	I	V	VII	X	Year	k	f	h	d	m
Norm. temp.	58.2°	—14.2	—1.1	14.7	1.2	0.1	40	—4	3	4	—1
Departure in Hebron		— 6.7	—5.5	— 6.5	—1.9	—5.1	1	0	14	6	8
» » Chimo		—10.5	—6.0	—14.1	—1.5	—4.9	15	1	13	6	7
Norm. temp.	51.9	— 8.5	3.9	17.2	5.4	4.5	39	—1	4	3	1
Departure in Belle Isle		— 4.3	—6.7	— 7.9	—2.6	—5.4	—6	—7	12	9	3

For these relatively high latitudes the warm autumn (h) is extraordinary, especially in such a continental climate. It would be very interesting to know the cause.

From a thermic point of view Labrador is thus most interesting. It has a special climatic type, the trend of the curve of the yearly temperature variation being very asymetrical (see JOHANSSON in Acta Geographica, Vol. 2, No 1). The type is oceanic in nature and seldom occurs at higher latitudes (see JOHANSSON in Gerlands Betr. 33, 1931), the autumn being fairly warm and greatly prolonged. It would be of interest to have an explanation of the causes which give rise to such a type.

Direct temperature observations for the interior of Labrador are available only from Mistassini and Chimo. However, by means of the comprehensive maps, Figs 144 and 145, one can approximately compute the local average temperature at a place whose height above the sea level is known. At the Lake Plateau, at an altitude of 550 m, for instance, with a temperature fall of 0.6° per 100 m increased height, the average temperature may be computed e.g. for Lake Petitsikapau in July at about 10.7° instead of the 14° on the meteorological maps showing sea level temperatures. This figure is plausible, for as a rule it has been shown, that the July isotherm for 10° rather closely follows the tree-line, which lies some 100 m above the lake. Under favourable radiation conditions, however, the temperature gradient may increase, whereas in cloudy weather the gradient is small. This method of computation thus gives only approximate figures; also, local topographical conditions may modify much the general thermic conditions. Such meteorological computations should therefore be used with the greatest caution and discretion. In climatology, only direct observations should be considered decisive.

Yet some general considerations concerning the thermic conditions of Newfoundland-Labrador, based upon notes collected from the literature, may be of interest to travellers and scientists until more systematic data become available.

Temperature conditions of the interior.

The winter temperature of the interior is very low and generally remains so with surprising steadiness all through the winter. During the winter season it often drops considerably on the interior plateau; BROOKS (99) reports —60° F. at a place removed from the influence of the sea. The lowest temperature recorded at Winnikapau post between 1866—1874 was —48.3°. The journals at the North West River Post record —47.2° as the lowest temperature from 1867

to 1893; —42.7° is, however, considered the minimum temperature of most years. At Rigolet the thermometer rarely registers —40.0°. At Fort Chimo —42.7° is said to be the lowest temperature registered (588). Still, a sudden thaw may occur even on the cold Lake Plateau owing to causes already explained. MERRICK reports such a thaw coming from the south on the 8th of January, 1931. In that year February was surprisingly mild in the interior, three dull days with thaw occurred in January and February, and it seems that the weather type had been changed by the cyclonic storms so often mentioned. Thus the meteorological average figures have only a relative application to the actual weather conditions. The diurnal temperature variation is also great, particularly in the open country. At night, the temperature is especially low as a result of the cooling action of the snow, and falls sharply during the nightly radiation, the more the slighter the insolation, i.e. the lower the position of the sun.

Local conditions can also lower the temperature. The masses of cold air which gather over the more elevated portions of the land, for instance over the Lake Plateau, are heavier than those at the margins of the peneplain, and consequently, under normal baric conditions, the cold air falls down and follows the radiating valleys towards the coast. This *bora-* or *mistral-like* phenomenon is one of the causes of the very low temperature found in winter time at the bottom of the deeper valleys.

An inverse thermic layering of the air masses during calm weather perhaps occurs also in the valleys, but of this no exact information has been found by the author.

With a certain exaggeration one might say that the higher land of the interior has only two seasons: winter and summer. The summer season begins almost at the same time all through the interior, and the sudden transition from winter to summer occurs, as a rule, during the first two weeks of June, when the snow disappears and the ice leaves the rivers and lakes except the largest where it often remains until July.

With the disappearance of the snow and ice, the day-time temperature rapidly increases. Trees and bushes then almost immediately burst into leaf (588). According to LOW, south and south-west winds prevail in the interior during the summer, and they are accompanied by a higher temperature and often by an overcast sky with drizzling rain. The west and north-west winds bring clear weather with a drop in the temperature, — especially during the winter season. North and north-east winds are usually accompanied by heavy storms with a cold, moist atmosphere and rain or snow. East and south-east winds blow, as a rule, with clear pleasant weather (588). These phenomena are usually conditioned by the powerful cyclonic action bringing a continous flow of masses of air from more southerly areas.

Yet on clear nights frost may occur even in summer. HIND (434) reports that on June 19th, 1860 ice formed along the river shores and on July 3rd, 1860 ice formed on the canoes. During 1894 frost was almost a nightly occurrence in the interior of the country until June 28th, when the vessels about the camp were found coated with a thin sheet of ice and slight flurries of snow fell in the morning (588). Mrs. HUBBARD also states (458) that clear nights can be frosty at any time:

at the northern extremity of Mishikamau Lake there was a coating of ice one eighth of an inch thick on a basin of water left outside the tent overnight. Still this year the weather was considered wonderfully fine during the two months from June 27th to August 27th. On August 13th to 15th Mrs. HUBBARD had snow flurries. At the beginning of October the smaller lakes freeze and the snow remains, the wind shifts, and when the monsoon-like north-west wind begins to blow the winter has begun (cf. p. 326). On the St. Lawrence the frost commences about the end of November (434).

Labrador's climate in the upper wooded district can therefore be characterized as sub-arctically continental, the average annual temperature amplitude can be estimated at 38°. The coldest months are December, January and February.

Temperature conditions of the seaboard.

The Labrador winter is considered to begin at the coast with the freezing of the sea. HUTTON wrote: then one puts on Eskimo clothes; be wise in time, because with the freezing of the sea the real Labrador cold sets in, the grim cold of the winter, when the dry, cold air from the interior, bracing and keen, makes one's lips stiff with icicles. An outdoor temperature of 50° or 60° F. below zero is not uncommon, and often the tea which is boiling at the beginning of a meal is coated with ice before the end (476).

Of the climate of Killinek the missionary PERRETT wrote in March, 1906: The winter has been excessively cold. The lowest temperature I have noted on the thermometer has been 32° F degrees below zero, but the cold has continued without what we might really call a break since last November. The wind has seemed to increase continuously. I do not think I have known so severe a winter in all the time I have been in Labrador (478).

The summer temperature of the Atlantic coastal region is considerably lower than that of the inland, as already mentioned. Here too, the heating agency of the sun is certainly rather high in summer, particularly in somewhat sheltered places. However, high temperatures are as a rule only of short duration because the faintest on-shore breeze brings cool air from the sea. Occasionally such winds may be due to cyclones. But in some years a sea breeze may blow for long periods and send cold masses of foggy air across the fence of skerries. Therefore the Gulf shore, for instance, has a very short, cool summer (169); the fog-laden sea breeze brings with it low summer temperature.

The temperature is thus to a great extent controlled by the direction of the wind. During northerly rain storms and foggy weather in the early summer FORBES observed temperatures between 40° and 50° F. In clear weather, when the wind blew offshore, the temperature sometimes rose to more than 70° in the heat of the day (275). In December the coldest winds blow from a westerly direction with a medium temperature of —21.6° and a frequency of 40 % in Hopedale, and in Zoar of —23.1°; in Nain, on the other hand, the north-west wind has a temperature of —23.0° and a frequency of 51 %; in

Hebron the south-west wind is the coldest, measuring —24.4°; in January the south-west wind predominates with a temperature of —21.5° (238). TURNER gives some examples from the country south of Ungava Bay (965): the south-easterly, southerly and south-westerly winds are warm during the summer, the south-westerly and southerly winds are warm at all seasons if blowing hard, but very cold if blowing lightly in winter. The temperature can drop fully forty degrees in half as many minutes when the north-easter breaks out (995). North-east winds bring fog and rain and snow. The north and north-west winds are usually very cold and apt to disperse the clouds.

A local heating of the air independent of the latitude has also been observed, especially in some fiords, and this undoubtedly has some connection with the direction of the winds; it is the f o e h n phenomenon. When the air brought by the prevailing western winds to the Atlantic coast ascends the mountains it loses its humidity on the western side of the mountain ranges and when it then glides down the slopes towards the east, it is dynamically heated (about 1° C per 100 m) and becomes dry and mild. This is the f o e h n or 'c h i n o o k', instanced by COLEMAN from the Nachvak fiord (157). It differs completely from the warm waves of directly cyclonic origin, because they bring thaw only with moist weather and precipitation.

There exist but few items of information concerning the temperature of the soil. TURNER reports that in the Ungava district the ground remains frozen from the last days of October — earlier in some years — to the last days of May, or even until the middle of June (965). In compensation the ground is superficially heated to a considerable depth in summer, even in the northernmost parts (400). However, it remains to be ascertained whether the earth does not remain frozen to a great depth underneath the thawed surface layer, as in other border regions between forest and tundra (cf. SCHOSTAKOWITSCH, Zeitschr. Ges. Erdk. Berlin, 1927, p. 394). Observations in this respect are lacking. With the altitude above sea level the heating decreases progressively because of the cooling action of the air circulation. On the other hand, if winds or tide fill the bays with ice, one finds an inversion in the temperature towards the sea with a difference up to —2° C. The icy cave temperature on the deep, northern slopes of the narrow, shaded bays contrasts strongly with the temperature of the warm, grassy slopes with a southern exposure.

Considering the prevailing low temperatures on Labrador in winter, it may seem paradoxical that in the Torngak Mts, which from a morphological

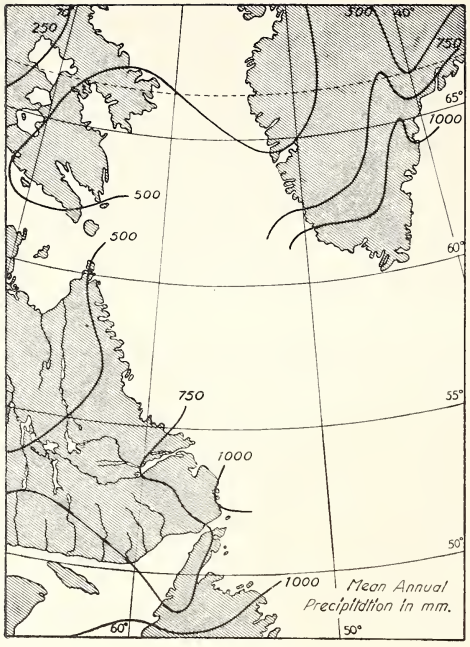


Fig. 148. The mean annual precipitation in millimeters in Newfoundland-Labrador and its surroundings.

point of view offer particularly favourable conditions for glaciation, there are only small glacierettes in the uppermost deep valleys and cirques; cf. p. 193. Until some decades ago, these glaciers had totally escaped notice, and it was believed that there were none in these mountains. As far as I know, Koch (528) was the first to mention the glaciers, but it was through Coleman (157) and Odell (692, 694) that the considerable number of small cirque glaciers and 'glacierettes', measuring only a few acres in extent, on the mountains of the highest massif in the Torngak Mts became generally known. The American Geographical Society's new topographic map of 1938, based on the aero-photographs of the Forbes-Grenfell Expedition, gives a very instructive picture of the actual state and distribution of the local glaciation in Labrador (154, 157, 1105, 275). In the Kaumajet Mts only two doubtful glacier rudiments have been discovered by Odell and Wenner. Their almost siltless meltwater feeds a series of blue-green tarns, and it is doubtful whether they are still active.

The living glaciers of the Torngak Mts number 53 in all. They are distinguished by their insignificant length as contrasted with their comparatively great breadth, in spite of the fact that most of them are deeply imbedded in cirques: the longest glacier (at 59° 32′ N) is only 1.9 km long and 0.65 km broad, and the broadest (Bryant's glacier) is 1.38 km broad and 0.58 km long; cf. Figs. 98 and 99. They have usually a rather short, main trunk fed by narrow branches, and with their tributary snowfields occupy limited areas at the bases of the cirque walls. They may be assumed to move at a slow rate, however, as the water issuing from beneath them shows the usual blue-green cloudiness from suspended matter.

Yet, these local glaciers were formerly large and powerful and cut great cirque valleys, divided by isolated, bold, sharp mountain ridges. In some places this local ice drainage is believed to have had an outlet to the sea. Since that

time they have receded more and more. The glacier of the northern slope of Mt Tetragona was examined in 1908 by E. S. Bryant and H. S. Forbes and photographs were taken showing the foot of the glacier in detail; in 1931 Odell took new pictures from the same spot. These show that the ice had receded about 80—100 yards since 1908. In the valley below three lines of recessional moraines mark halts in the gradual retreat; the lowest is at 1175 feet above sea level and is well covered with vegetation (694). Cf. p. 193 and Figs 98 and 99.

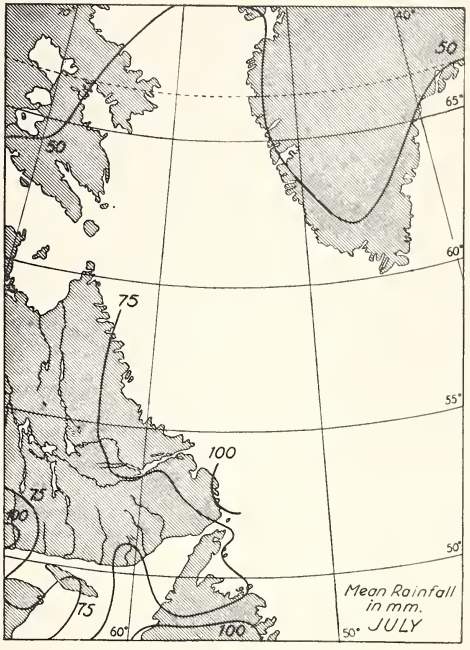


Fig. 149. The mean precipitation in July in millimeters in Newfoundland-Labrador and its surroundings.

The cause of the inconsiderable extent of glaciation in the Torngak Mts is evidently to be sought in the prevailing dryness of the north-westerly or westerly air currents which sweep over Labrador. The condition for the formation of glaciers is that more snow is deposited in winter than can melt away in summer. It seems clear that snow does not now fall in sufficiently large quantities on the northern part of the peninsula to feed any large-sized glaciers on those mountain slopes lying in the lee of the snow-bringing, prevailing northwesterly winter winds.

Precipitation.

Table, p. 290 sq., and Fig. 148 should be consulted for the mean annual precipitation and its variation during the year; their distribution and the mean rainfall during the year and the principal growing time in July is shown schematically in the cartograms, Figs 148 and 149. There is, however, no other climatic element of which the local variations are greater, and which is more dependent on local topographical forms, than precipitation; the presentation should therefore be read with criticism.

From the above cartograms may be noted the general similarity between the Atlantic coasts of Labrador and south-east Greenland in respect of precipi-

tation. The distribution of mean precipitation on these coasts is in general similar, but in July Greenland is comparatively dryer.

The observations show that the amount of precipitation decreases towards the interior with the distance from the warm and moist air masses of the Atlantic. Also it diminishes regularly from the south towards the north along the seaboard. The rainy season is the later part of the summer and autumn, whereas the precipitation figures for the winter months are small, cf. Fig. 146. The stations show a pronounced maximum of precipitation about September. During the winter half year Hebron for instance has only 28 % precipitation, but this means fairly certainly that the place is so windy that during slight snow-falls the precipitation has not affected the pluviometer. The values from Ramah with 45 % precipitation during the winter and 55 % during the summer seem perhaps to be more dependable. The average of the two stations is a more reliable expression of the annual variation of precipitation in mm:

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XI—IV	V—X	Year
$\frac{\text{Ramah} + \text{Hebron}}{2}$	24	22 ×	27	46	34	52	55	67	78	56	51	33	203 37 %	342 63 %	545

The frequency of days with a precipitation of 0.25 mm or more (not reduced) (169, tab. 10) gives a different impression:

	J	F	M	A	M	J	J	A	S	O	N	D	Year	Years
Belle Isle	4.7	5.5	5.4	5.0	5.0	5.1	5.8	5.1	5.2	5.4	5.4	4.9	62.5	(12—22)
Zoar	8.3	7.1	10.1	9.6	10.7	11.0	11.9	10.1	11.3	9.1	9.8	8.2	117.2	(7)
Nain	7.6	7.7	10.0	10.0	11.0	10.3	8.7	10.0	9.1	10.8	9.7	10.1	113.2	(8)

The rainfall near the Atlantic coast is either cyclonic or orographic, and in the latter case much influenced by the topography of the surroundings of the station.

In summer the precipitation is usually due to cyclones generally approaching from the south-east. In the summer months therefore the maximum precipitation is at the southern parts of the Atlantic coast, and from there the amount decreases towards the interior and northwards along the coast; cf. Fig. 149. On the other hand at the northern portion of the coast, where the mountains rise higher, there is heavy rain of the orographic type when the moist winds from the sea are forced upwards. At the interior the amount of precipitation is not great, but is said to be fairly constant, as a day rarely passes without drizzle or thunder showers, which also lower the temperature (588).

Summer showers at the coast are usually moderate. But when the north-eastern blows hard in late June and all through July, abundant showers can set in which soon fill brooks and torrents with foaming breakers and give the

scenery an exotic aspect. Foggy weather is usually accompanied by fine, drizzling rain, and, especially at the northernmost part of the coast, this is said to be why there are few days without precipitation; in these parts one may be soaked to the skin by drizzle lasting for hours.

During the winter the precipitation is, of course, essentially in the form of s n o w: Days with snow of 0.25 mm or more (not reduced):

	J	F	M	A	M	J	J	A	S	O	N	D	year
Zoar	9.5	7.8	10.3	6.8	8.0	3.0			2.6	5.2	8.9	8.1	70.2
Nain	7.8	8.0	9.2	8.6	8.4	3.2			1.4	5.9	6.9	7.9	67.3
Hebron	10.5	6.8	9.7	10.7	11.3	5.3			3·7	6.7	7.9	7.7	80.3
Ramah	5.4	5.3	5.3	6.5	6.3	3.0			2.7	3.6	5.4	5.3	48.8

Even in the summer months snow may fall; the 28th of June, 1864 was almost wintry; after dinner there was a dense snow storm; we were wind-bound, breakers ran high, PACKARD reports from Chateau Bay (716). On the 25th of July, 1897, thick snow fell at Cape White Handkerchief (862). A heavy snow storm raged at Sandwich Bay on June 10th, 1939, cf. also p. 309.

At the south and south-eastern coasts December—February is the period richest in snow. In winter time cyclones migrating from the south-west or west carry snow and rain to the Gulf coast, where the amount of solid precipitation reaches its maximum in Labrador. At the close of March 1—1.5 m of snow may be lying in the forests in this part of the country (169). This snow presents an important problem to the engineers who must control the freshet water running into the tributary streams when the stored moisture suddenly melts with the spring rains.

From the Gulf coast the amount of precipitation in winter decreases northward all along the Atlantic coast.

Owing to its predominantly cyclonic origin, the amount and frequency of precipitation can be very variable, as is shown by the following few examples:

In Hebron, the greatest amount of precipitation was recorded in September 1891, 167 mm; the mean pressure was then fairly low, 754 mm, the wind rather high and the temperature 3.7°, one of the lowest monthly averages for September. The lowest precipitation figure, 1.4 mm, was recorded in November, 1888. The winds from north to east were then 0 %, the mean pressure was 756.2 mm, as against the average 755.0 mm, the temperature was —8.9°, one of the lowest mean figures for this month. Also in January, 1891, Hebron had a precipitation of only 3.3 mm, but the pressure was fairly high, 759.2 mm, as against the average for this month, 754.3 mm; winds from south-west to south-east predominated by 59 % over the north-easterly winds, 6 %;

the mean temperature was —20.2°. On the other hand, January, 1888 had a precipitation of 72 mm, the mean pressure was 755 mm and the mean temperature —17.2°.

These instances will be sufficient to indicate the clear connection between the precipitation and the direction of the winds at all seasons of the year. The land wind from west and north-west is cold in winter and contains little moisture; therefore it brings little precipitation. On the other hand, the south-west wind (apparently a deflected south wind) is somewhat richer in precipitation. The greatest amount of precipitation falls in calm weather at a comparatively warm temperature, and the next with relatively mild north winds coming from the ocean. This also applies to the relatively rare easterly and north-easterly winds in winter.

On the other hand the north-west wind, which blows at least during three-quarters of the winter season, is accompanied by a bright, clear atmosphere. The air is said to be so clear that the eye loses all sense of distance in these treacherous white, snow expanses.

On an average, the amount of precipitation cannot be great in winter over the interior. It is said that the snowfall varies from three to six feet, but while the north or north-east winds blow, the greater part of it is carried away to southern latitudes. During my flight over the south-eastern coastal region in July, 1939, from the Straits to Cartwright, it was very surprising to see the landscape filled with big snow drifts on the southern slopes of the hills and mountains, whereas the northern sides were quite free. The explanation of this is evidently that the accumulation of the drifts had occurred during the winter with northerly to north-westerly winds.

Owing to the comparatively southern latitude of the Labrador coast the air is considerably heated during bright summer days and absorbs a great amount of moisture. On the other hand, it greatly cools off again at night, especially near the shores of the ice-cold sea-water, and the moisture is condensed. The rapid diurnal warming and equally rapid nocturnal cooling of the air produces a very great change in the relative humidity: low humidity occurs during the day and a high percentage of humidity after the rapid cooling by radiation during the night, resulting on clear nights in the formation of abundant dew. Close to the seashore very heavy dew falls; the walls of the tent do not dry till the afternoon if the weather is calm, and pools of water can remain on the tarpaulins the whole day; it is therefore always wise to put up the tent at some distance from the shore.

Yet, the climate is considered rather dry for this latitude. At the fishing stations in some years when there has been little snow, drinking water is scarce

when the brooks dry up after fine weather; only stagnant water is then available, which must be boiled before drinking (862).

The duration of the snow covering is an important climatic indicator, but we have little knowledge of the number of days when snow falls except at the coast, and few records exist of the number of days when the ground is covered with snow. An extension of this period is, however, bound to influence many geographical phenomena. The snow protects the ground from freezing and consequently favours herb vegetation. In many places where the snow covering is not formed until the cold has set in, the ground may remain frozen almost all the year round and cultivation is impossible.

The following more general phenological notes concerning the precipitation which I have collected from the literature or from the inhabitants may be of some interest (cf. p. 325 sqq.).

As a rule snow falls and ice begins to form in the small lakes north of latitude 52° about the middle of September. From the beginning of October all the smaller lakes are solidly frozen and the snow lies unmelted. Thus the summer season is limited to about three months for the greater part of the interior plateau (588). The journal kept at the Winnikapau Post between 1866 and 1874 records that the first snow generally fell about September 20th and that the snow cover remained until June, the latest record being June 10th (588). In the interior of the country trappers can use dog teams at the end of October, at the coast at the end of November. As a matter of fact the ground is covered with snow at a much earlier date, but *komatiks* (dog sledges) are not resorted to until the surface of the snow is hardened by the wind. The ice-crust (skare) on the surface of the snow forms at North West River at the beginning of March and makes communication easy. At the coast and in the neighbourhood of Lake Melville, dog sleighs are however not used later than about the 10th of May, because later they sink through the crust which thaws in the day-time.

At North West River snow falls early in October and from that time onwards until about the first week in May, the latest record being July 2nd (588). As a rule, the snow has disappeared from the coastal regions about Hamilton Inlet in mid-June; only the mountain tops in the north show glittering spots of white against the blue sky. Curiously enough the snow at the Atlantic coast disappears more rapidly at higher levels than at the shore itself; here can be traced the cooling influence of the Labrador Current.

Early in autumn the snow begins to powder the mountain tops on the northernmost part of the peninsula, and slowly but surely the white mantle spreads down the slopes. On September 6, 1906, snow fell in the region of Killinek. On September 15, 1905, the winter snow already measured 0.5 m. In October the lakes begin to freeze gradually, but not until the end of October does the sleighing season start in Killinek (400). Sleet usually falls in violent squalls from the middle of September till the beginning of December, then snow until the middle of

April, followed by sleet and snow until the rain sets in. But snow can fall every month (965).

The summits of the lower elevations in the excessively varied interior landscape around the George and Koksoak Rivers are shrouded with snow as early as the 1st of September, the higher summits having snow patches here and there all the year round (965). The lower regions about Fort Chimo are covered by a permanent layer of snow from the 1st of December till the 10th of June. Brilliant snow patches cap the higher hills until the last day of August and by the middle of September snow again covers the tops of the high hills (588). By the last of July it has entirely disappeared from all elevations not exceeding the height of Fort Chimo (588). On higher, broken land above the tree-line, the cover of snow does not settle permanently, because the wind, which rules all things on the higher plateaux, masters even the snow and keeps the rising ground clear; this is of the greatest importance to certain animals and particularly to the caribous which find pasture on these snow-free spots.

Winds.

Looking at the wind-roses from Labrador, representing the percentage of frequency of the different winds (see in 238, Table 4, Fig. 12), one is struck by the strong influence exercised by the local topography on the wind directions, for instance at Hebron and Hopedale. One should therefore not infer anything of importance merely from a few local observations of the winds. Yet it is possible to draw some general conclusions from the available meteorological observations. The average frequency of winds in percentage of all winds has been computed by Professor Osc. V. Johansson from observations (in 169, Table 4) at:

	winter (XII—II)	summer (V—VIII)	year
Hebron	N 85° W	N 20° W	N 56° W
Hopedale	N 82° W	N 39° W	N 61° W
Belle Isle	N 52° W	N 74° W	N 52° W

Westerly winds thus predominate. In the winter the wind at Hebron and Hopedale is nearly west, but it turns clockwise 65°, or 43° more towards the north in summer. At Belle Isle, on the other hand, the direction of the wind is more nearly north-west in the winter and turns the opposite way 22° towards the west in summer. The stability of the wind decreases from the north towards the south. In Hopedale the wind velocity is fairly even and comparatively high all the year round. On the other hand, further northwards, for instance in Hebron, the barometric oscillations are greater, the wind velocity is therefore higher in winter, while in summer, when the difference

in temperature between land and sea has been levelled out, the barometric pressure differences are lessened and the wind velocity decreases. However, the cloudiness is somewhat greater in Hopedale than at the other stations (cf. 238).

My general impression from the coast in summer time is that storms are rather rare, not very violent and of short duration. Yet experience has shown that violent gales occur almost regularly in early September (275), and during this critical time one is well advised to avoid the bad weather at sea and confine investigations to the land. The autumnal gales especially can become very strong (829 b 1, 880 a). The terrific gales which swept over the Labrador coast between the 12th and 15th October, 1885, causing enormous destruction, will long be remembered. Eighty schooners and three hundred lives were lost and two thousand people rendered destitute (325, 182).

Considering the matter from a theoretical standpoint we arrive at the following conclusions which are confirmed by observations:

In the summer time, when the circulation follows the fundamental course (cf. p. 288 sqq.), a pleasant south-westerly breeze usually blows over Newfoundland-Labrador. It is a moderate, steady, warm air current, with the balsamic scent of the resin of the spruce forests in the interior. It brings an almost cloudless sky and can last for several days. When blowing hard from the west this wind is remarkably warm and very dry at the Atlantic coast. The high temperature of the air current is due to its point of southerly origin: the high pressure zone of the Northern Atlantic. However, such an off-shore wind will locally show characteristics peculiar to the foehn as evidenced by its exceptional dryness: therefore, it is associated with desiccation. At Lake Melville I observed these conditions in spite of the rather small differences in altitude of the land over which the air had to pass. It was said that sometimes when such winds occur Goose Bay is blown quite dry, canoes are hurled into the air, and foam is dashed over the tree-tops. If the differences in altitude are great, as for instance in the north-eastern part of the peninsula (p. 65 sq.), the off-shore wind will be dynamically heated nearly 1° C every 100 m it descends, and will therefore, as already mentioned, be desiccated to an extremely high degree. This so-called c h i n o o k effect has been reported by Coleman from the Torngak Mts. In the latter case, however, the foehn is probably often combined with a cyclonic system.

In winter, under the normal conditions of circulation, the cold, dry air in the high pressure area of north-west Canada will flow out as a winter-monsoon on all sides in accordance with the baric wind law. As a result of

the rotation of the earth the moving air masses are deflected to the right in the northern hemisphere. But Labrador lies also in the south-westerly quadrant of the great low pressure area centred south of the line between Iceland and Southern Greenland and for this reason the cyclonal winds become accordingly north-westerly or westerly. In winter these two impulses are united and result in a much accentuated icy wind from about north-west over the peninsula, especially in December, when the mean pressure falls to 1006,4 mb and the average wind velocity rises to 5.7 m per second in Hebron (99). This is why in winter the strong winds from about north and north-west blow with surprising steadiness and regularity. The sky is clear, the sunshine pours over the dazzling blue-white moorland and bogs, where only dark-blue shadows reveal the existence of precipices and chasms. The number of really stormy days varies during the winter. Northern storms may occur which are exceedingly violent: the icy wind penetrates one's clothes like a knife, and above the mountains eddies of snow are whirled up to the sky like clouds of smoke, the trappers say. In the depth of the Labrador winter fine days without blizzards are rare on the coast. HUTTON states that the howling north-west wind, the *attuarnek* of the Eskimoes, storms along with a ceaseless roar from the frozen plains and valleys in the north-west and fills the air with powdered snow — *pertok* [drift] — as thick as a London fog. No living thing can face it, buildings shake, snow huts are worn thin. When the snowdrift is thick one can scarcely see anything half a dozen yards away, on some days one cannot see the dogs, one is lost »somewhere in Labrador». One is lucky to be able to stay in the stiffly frozen tent — in wet clothes one would be frozen in no time and that can be the end (478). The fishermen say 'When the bones begin to ache you know the big storms will blow'.

The monsoon phenomenon is thus conspicuous and its strength has been computed by JOHANSSON (following the methods of RYKATSCHEFF and HANN) as follows:

					Winter		Summer	
	Direction	M	I	M:I	a	N	a	N
Hebron	ENE	34	45	0.75	WSW	45	ENE	23
Hopedale	ENE	21	28	0.75	SW	24	ENE	18
Belle Isle	SSE	18	24	0.75	NW	23	SSE	12

Thus it decreases towards the south. It is about as well developed as in Texas or at the Fennoscandian coast of the Arctic ocean, but remarkably weaker than in eastern and southern Asia.

During the winter, the coldest winds in Hopedale and Nain blow from the cold part of the continent to the west. The less common north winds are, on

the other hand, warmer by several degrees, and the north-eastern winds are also essentially warmer. In Nain westerly winds bring in February an average temperature of —24.0°, the north wind even 0°. In Hebron the difference is generally greater (238). This proves the influence of another element:

The cyclones and their effects.

Meteorologically the country is interesting as its southern part is tangential to the track of many barometric minima in passing from America to the North Atlantic (99). The tracks of lowest pressure pass over the St. Lawrence principally towards Iceland, but some of them also branch off towards Davis Strait (for the cyclonic tracks, see 169, Fig. 53, January, and Fig. 54, July). South-westerly or north-westerly winds consequently blow in the winter over the peninsula in towards the cyclone's path which changes according to the pressure. The paths of the cyclones coming from the southern Atlantic seaboard or the western parts of the continent usually concentrate in a comparatively narrow zone on the margin of the cold high pressure of the Labrador region (cf. 169). If the low pressure passes south of Labrador, north or north-west winds predominate; occasionally the low pressure seems to become stationary for some time over the Gulf of St. Lawrence. On the other hand, when the low pressure lies out in the Atlantic, the wind shifts more to the west; when it veers towards Greenland and Davis Strait the winds are south-westerly. Thus southerly, south-easterly, easterly, north-easterly and also northerly winds are much rarer in winter. The influence of the winter depressions is naturally most strongly felt in the southern stations, including Hopedale and Zoar, and calm weather is much less common than in Nain and Hebron.

The winter is thus the most tempestuous season in Labrador, for the special reason that two influences are brought into play simultaneously in its southern parts as already indicated (cf. p. 288 sq.): on the one hand both the temperature and the pressure gradients between continent and ocean then attain their maximum, and on the other the cyclones frequently bring the cold, dry air of the winter monsoon and comparatively warm air masses laden with a high percentage of moisture into contact with each other. This results in the violent gales and rains changing into heavy snowfall, which are a special feature along the Gulf coast (cf. p. 307).

In the summer time this same phenomenon also occurs locally along the Atlantic coastal region, but naturally only on a small scale, in places where the cold air over the Labrador Current is forced beneath the offshore outflow of warm air from the peninsula. Local pressure differences arise at the 'cold front', causing whirls in the air; thunderstorms of short duration, sunshine,

fog, squalls and clouds succeed each other. I have observed up to six such local thunderstorms in one day. A thunderstorm raged in the region of Cape Chidley on the 26th July, 1906. At Lake Melville I experienced violent thunderstorms in the middle of July, 1937. The rays of the sun penetrating rifts in the clouds make rainbows and other atmospheric effects stand out in a rich variety of colours, lending beauty as well as grandeur to the scene. Bell believes that it can hardly be excelled in any part of the world. Mrs. Hubbard described the coast as »the land of the rainbows», and I find this very expressive.

The extremely low percentage of absolutely calm days in the coastal zone as well as the variability of the weather are partly due to these local air disturbances. In the evening the stars are clearly mirrored in the sea, but on awakening in the morning one finds that the wind has shifted and that land and sea are shrouded in fog and drizzle. Suddenly a storm of such violence may arise that small vessels are uncontrollable. »Never say a day is beautiful before the evening» is a popular saying in Labrador.

In summer the strong winds are due to the large cyclones which bring masses of tropical air to this northern area. Also, small satellite cyclones, 'secondaries', are often detached in various directions. These cause what the fishermen call »North-east flurries» (903), which occur suddenly and quite without warning, preceded by a dark streak on the surface of the sea and causing a drop in the temperature of 5—10°.

In summer, the approach of a cyclone is heralded by some special signs: first the mountains are enveloped in the humid air of the periphery of the cyclone, then clouds soon form above the tops because the moist air is forced up the slopes so that condensation sets in. But over the cold sea also banks of fog will after some time arise and sweep in over the outer islets. The icy on-shore wind then brings sheets of rain. Slowly the clouds on the tops creep downward and engulf the mountains, the fog banks over the sea roll up on to the land. After a few hours a sudden, keen wind from the north-east or east brings the temperature down to 5° or 6° C. Now the rain-swept sea is lashed by an icy gale. The rain continues ordinarily for two or three days and then the wind slowly turns to the north or north-west; then there follow some heavy gusts and the sky clears. Slowly the temperature begins to rise and a westerly breeze or calm weather sets in.

Such biting, moisture-laden winds may sometimes check every kind of activity for three days until they have blown themselves out. On such days Labrador is not suitable for a romantic summer cruise. On the other hand they prove of great benefit in blowing away the mosquitoes.

In the winter, a northern storm is heralded by a cloud drifting quickly from the north at a low altitude above the sea. It soon changes into a dense grey wall and comes tearing along; in a few minutes it is upon you. Though you turn your back to the wind it cuts savagely even through a sealskin coat; the 'attuarnik' seems to wish to devour you (476).

Thanks to the observations of the Rev. PAUL HETTASCH we have a good description of the passage of a winter cyclone. At the beginning of February, 1933, the westerly monsoon had been blowing in Makkovik, the air pressure was comparatively high and the temperature low. On the 9th of February the air pressure began to fall sharply, the temperature rose, and after an interval of calm a north-easterly wind began to blow at 8—10 o'clock in the morning with a velocity of 6. The sky became entirely overcast, and following the sporadic snowfalls of the preceding days a heavy snowfall set in with rain and hail; visibility decreased to 50 m. Then the wind changed gradually by way of south-east to west and the air pressure began to rise in the evening, the temperature fell and the wind grew into a storm with a velocity 9 (66—77 km per hour); visibility increased to 1—2 km. Later the sky again became entirely overcast, visibility sank to 50 m, and snow began to fall again. On the 10th of February the weather cleared up and visibility was almost continuously up to 10 km. Cf. 880 a.

The passage of the small cyclones (secondaries) from the sea is usually characterized by a sharply falling pressure, a sudden shifting of the wind and a violent on-shore storm of short duration. The sea is immediately set in violent motion and the air current is so strong that the crests of the waves are torn to spray. The animal life seems to be blown away. Heavy surf beats on the shore. It can be difficult to walk upright on the mountains, and to go fishing in boats is out of the question. Many fishermen have been frightened to death, expecting every moment to be drowned, when overtaken by such cyclones (862). However, after a few hours the wind usually veers to the north-west and the storm dies away in a few transient, cold and piercingly violent gusts.

THE INFLUENCE OF TOPOGRAPHY.

The general movement of the air is greatly influenced by topography. The cyclone's system of isobars does not fit in very well with the peculiar morphology of the coastal stripe. It is therefore probable that small local pressure areas arise, caused by the congestion or the sucking action of the cyclonic air current over or along the coastal area (cf. PETERSEN for Greenland). The strength of the wind may then be the outcome of local conditions. Even when the sea lies in a flat calm heavy gusts blow down from the mountains, and the

winds are apt to attain a much greater velocity at the heads of the fiords than at their mouths. These winds sweep with great speed through the small valleys of the steep-sided leeshore as through large funnels, and instead of shelter, one always finds the roughest water on the leeward shore of the fiords, whereas there is a pleasant wind and warm sunshine on the windward shore. These violent winds are often so warm that they no doubt form a kind of small scale chinook arising to some extent from heating due to the same mechanical reaction as the foehn wind (157, 692, 275). If there is a relative calm in the atmosphere it is not unusual that in summer the sea breeze blows along the fiords and in autumn the land breeze in the opposite direction — a kind of local monsoon.

The Labrador Fog and its frequency.

The fog is especially characteristic of the Labrador climate in the coastal regions. To understand fully the feeling of uncertainty associated with navigation in the Labrador fog, it is perhaps necessary to know the sensation of making one's way at a speed of a few knots in the confusing, scantily charted archipelago in a fog so dense that the prow is blotted out, listening in breathless suspense for approaching vessels and trying to steer by the roar of the breakers against the rocks or the lapping of the waves against the sides of the icebergs. Ghastly stories are told by fishermen of their experiences in sudden fogs: while working on the ice they lose sight of their ship and cannot find her again when the fog lifts. On reaching the shore of an island, exhausted and shaken by their terrible adventure, they might be fortunate enough to be saved from starvation by visiting Eskimoes (761, 423).

The danger of fog and ice combined reaches its maximum south-east of Newfoundland (881). Where the Labrador Current meets the Gulf Stream off the Newfoundland Banks a dense fog is produced; this is too one of the foggiest regions of the world, and there the fog and the icebergs tend to make navigation perennially uncertain and even dangerous (510). The transatlantic shipping routes have therefore to be moved north or south with the season, i.e. with the frequency of fog or fog and drift-ice respectively. The Labrador coast is hardly less dangerous; when inky darkness and dense fog cover the sea and visibility is nil, the ship may suddenly run into a large iceberg (478, 434, 486). Under these conditions it is wise to anchor at once; Fig. 154.

It is common knowledge that the frequency of fogs on the American side of the North Atlantic is much greater, absolutely as well as relatively, than on the European side. At the Newfoundland Banks the foggiest period extends

from April to August, in September the fogs suddenly decrease to a considerable extent; February is considered the month when fogs are least frequent. The maximum frequency is at the eastern border of the Banks within a long, narrow belt, where the relatively light water of the Labrador Current meets the salt, warm water of the Gulf Stream flowing at a somewhat greater depth. On the western side of the Banks the frequency is rather lower, as the sudden

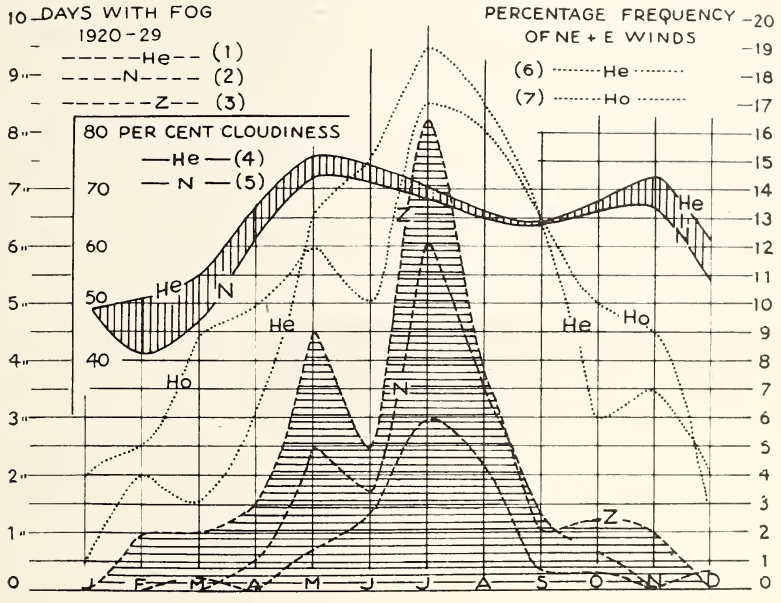


Fig. 150. The frequency of fog, cloudiness and north-east + east winds on the Atlantic coast of Labrador.

1. Days per month with fog at Hebron (He).
2. » » » » » » Nain (N).
3. » » » » » » Zoar (Z).
4. Percentage of cloudiness at Hebron (He).
5. » » » » Nain (N).
7. Percentage frequency of NE + E winds at Hebron (He).
7. » » » » + » » » Hopedale (Ho).

contrasts of temperature caused by the meeting and struggle of the two currents have here been mitigated. SCHOTT's maps seem to show that the farther south the drift-ice belt extends, i.e. the more active the Labrador Current, the denser the fogs and the higher their frequency (831).

Thus fogs are chiefly due to the Labrador Current. Roughly in accordance with these principles the fog zone extends from the Newfoundland Banks with successively decreasing frequency to the north along the Atlantic coast of

Labrador, the greatest accumulation of fog being now to the east, now to the west of the Labrador Current, wherever the conditions are most favourable; cf. Fig. 153. At the Atlantic coast in summer fog never extends far into the land. I have seen fog hover for days over Hamilton Inlet, now touching the water and hiding all but the nearest shore, now rising a few feet to give a glimpse of the coast, while Rigolet was bathed in sunshine. In summer the sea fog rarely extends as far as the North West River. FORBES says (275) that the contrast between the foggy, icy air of the outermost coastal strip in the north and the warm sunshine at the heads of the bays is vivid and pleasant.

The drift of warm air from the south towards the colder regions of the North Atlantic, where the warm, moist air is mixed with the cooled air over the cold water surface (cf. Fig. 151 and p. 288), always favours the formation of fog (831, 169). On the other hand, where the water is warm there is no condensation. The air over the Labrador Sea is relatively warm and humid and the air which has passed over the Gulf Stream is especially saturated with moisture. When such very moist air moves towards the north-west in front of passing cyclones, or as a result of the general circulation in a warm summer, it will become mingled with the cold air above the Labrador Current and cooled. If the resulting mixture contains a higher percentage of moisture than the dewpoint of its temperature admits, condensation occurs either in the form of fog or of drizzling rain, or both combined. This 'advectional' type of fog may become very dense and stretch to great heights above the sea level. In nine cases out of ten a heavy swell from the east or south-east is the forerunner of this kind of fog. Already at a distance one can see the fog banks approaching as sharply outlined clouds along the seaboard.



Fig. 151. Fog forming by the influence of the humid, south-westerly wind which began the 18th of July 1937 to sweep over the cooled air layer above Double Mer. Photo the author.

Fog is less common when westerly or south-westerly winds prevail. Yet fog may arise in midsummer when the warm air of the inner continent, containing a relatively high percentage of moisture, passes along the valleys to the cold waters off the Labrador coast; cf. Fig. 151. This conjuncture favours the

formation of fog all along the coast from the Straits towards the north. It is then sometimes possible to follow the process in all its stages. The condensation generally begins with a reaction current of cold air from over the Labrador

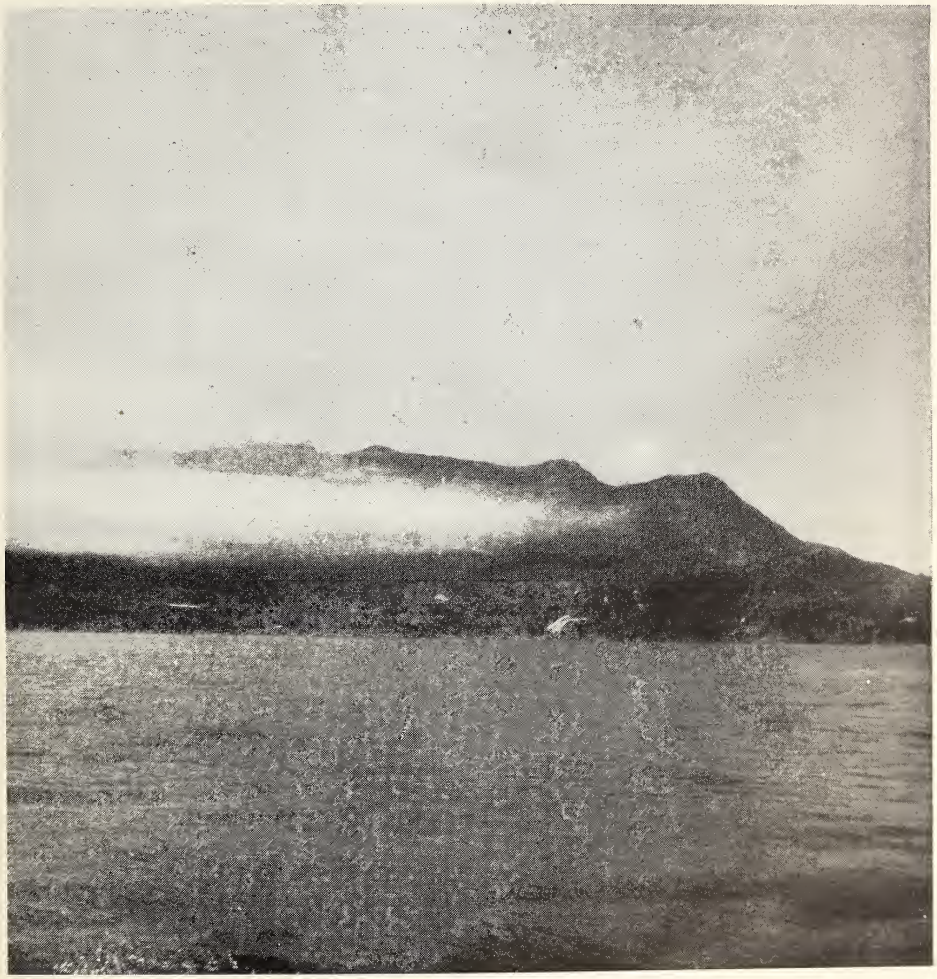


Fig. 152. The wind turns on-shore and immediately fog begins to arise by the cooling of the warm humid air on the sun-warmed southern slopes. Photo C.-G. Wenner, 1939.

current slowly sweeping into the bays under the air masses from the land: a very thin, sharply outlined veil of fog is quickly formed as the surfaces of these currents touch. This distinctive cloud layer is visible for some ten minutes only and is then gradually destroyed by a whirling motion of the air.

The whirls grow larger and soon the fog comes, also from the sea, rolling in cold, dense patches towards the land and shrouding the tops of the mountains in cloud. This process we were able to follow e.g. in Port Manvers August 10th in 1939.

In the eastern portion of the Gulf of St. Lawrence fog is caused over the comparatively warm waters of the Gulf by tempered polar-continental air returning to the region of the Straits of Belle Isle and the southern coast of Labrador. In June these fogs may be found as far south as the Magdalen Islands (169); cf. also Fig. 152.

These types of fog usually last for two or three days, but seldom longer. The most inconvenient type of fog arises in calm weather with a clear sky.



Fig. 153. Looking from the entrance to Ryans Bay over the mist belts forming where the cold flow-bands of the Labrador Current rise up to the surface. (Cf. 692). Photo Forbes-Grenfell Expedition, 1931.

Fogs of this type are extremely dense, »white» and »dry», but they do not rise to any considerable height above the sea level, sometimes not even above the mastheads of the schooners. On the other hand, they may last for ten days or more. Whether the condensation of the moisture is caused in this case by radiation seems to me uncertain; most probably it appertains to the advectional type.

My skipper told me that in the latter part of June, 1937 a dense fog settled all over the Straits of Belle Isle and remained there for two weeks. In the last days of August, 1937 we too were plunged into the dense fog of the Straits of Belle Isle and were compelled to travel blind. Visibility being absolutely nil, we felt rather uncomfortable at the prospect of crossing the Straits with the busy traffic of liners and cargo boats. We sought harbour under the coast of Newfoundland. Chilling mist covered the water and through it we could at times discern the dim, forbidding coast line and hear the ponderous thud of

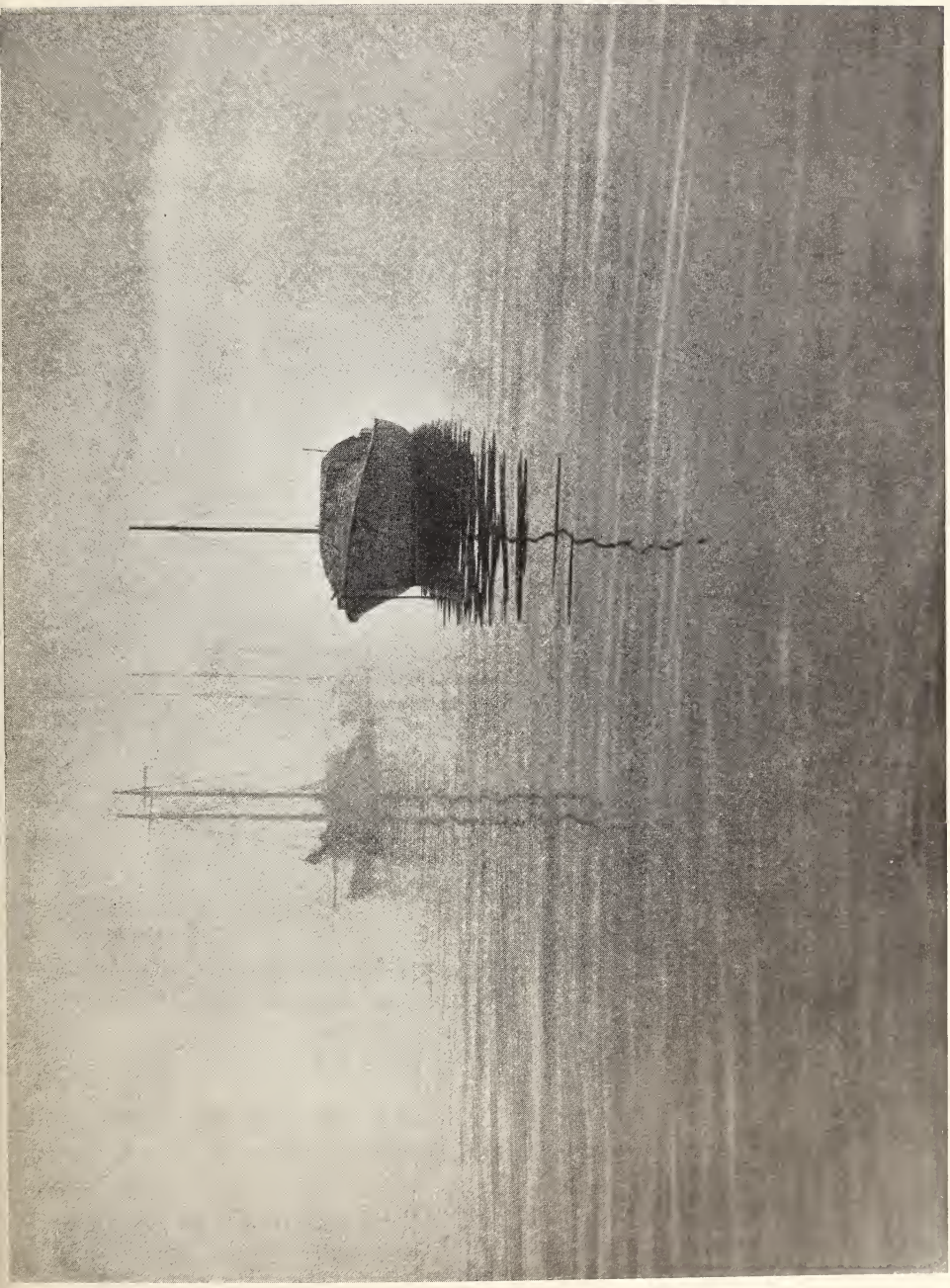


Fig. 154. The dense Labrador fog sweeps in from the sea and the ships are compelled to anchor (536 a).

the sea beating against the cliff wall. Suddenly we caught a glimpse of Flowers Cove, but a few cable-lengths away from the difficult entrance the fog again hid the view and we were compelled to turn back across the Straits to Forteau. The most amazing thing was that we could not hear the signals from the powerful fog-horn at Amour Point, although we were undoubtedly drifting close to this lighthouse.

In the fall of the year the fog is not confined to the coastal zone; it penetrates even the interior. Here the period of increase to a maximum of fog frequency immediately precedes the time when slight flurries of snow may be expected. Both are undoubtedly connected with the strong cooling by night radiation of heat on the uplands to the north, as well as with the rapid decrease of daytime surface warming due to the polar air moving from the northern regions. Thus, while there is frequently frosty, foggy air in the tributary valleys on autumn mornings, the air over the estuary is considerably warmer and fog is only local (169).

In Labrador fog frequency varies with the season and the weather type of the year. There are summers with a comparatively low frequency and the most perfect weather, as for instance the summer of 1937 (cf. also George G. Williams in 275), whereas the summer of 1939 was extremely foggy. According to my notes, fog frequency in July rose to 37 % of the days of the month, in August to 46 %. Delabarre found that in 1900 the clear or partially clear days by far outnumbered the rainy days. In 1936 about 65 % of the summer days were predominantly sunny north of Hopedale, and it was estimated that during 60 % of this time the weather was suitable for flying. 1932, on the other hand, had a rather large percentage of bad weather (275).

The average fog frequency is shown in the following table.

Days with fog at the seaboard (169, table 9):

	J	F	M	A	M	J	J	A	S	O	N	D
Belle Isle	—	—	—	—	—	13.8	18.5	18.5	12.9	16.4	14.5	—
Zoar	0.0	1.0	1.0	1.5	4.5	2.5	8.2	3.7	1.0	1.2	0.1	0.0
Nain	0.0	0.0	0.0	0.5	2.5	1.7	6.0	3.5	1.3	0.6	0.0	0.3
Hebron	0.0	0.0	0.2	0.0	0.7	1.3	3.0	2.2	0.3	0.3	0.0	0.0

The number of foggy days thus varies in the course of the year: much fog in summer, little in winter. Maximum frequency occurs in July; cf. Fig. 150, but there is a secondary maximum too in May and a tertiary, very feeble maximum in October. These last two appear just at the time when the ice on the ocean breaks up in the spring and when it begins to form in the autumn. Judging by the graph there is no correlation between the primary maximum

of fog and the cloudiness, but certainly between the cloudiness and both the minor maxima. In addition there is a clear connection between the occurrence of fog and the frequency of the north-easterly + easterly winds. There may too be a connection between the fog frequency in different years and the volume of the Labrador Current.

Moreover, the frequency reaches its maximum at the south-eastern corner of Newfoundland-Labrador and diminishes thence northwards; cf. the graph, Fig. 150. However, the statement in the Encyclopedia Britannica that fog seldom occurs north of the Straits of Belle Isle is, to say the least, an exaggeration. It is also a mistake to assert, as Newfoundlanders often do, that the coast stretching to the north from the Kiglapait Mts is particularly foggy. On the contrary, I found the northern part of the Atlantic coast fairly bathed in sunlight under a perfectly clear sky during the later half of July, while regular but rather faint easterly and north-easterly winds were blowing.

The local morphology of the coast is naturally of great importance climatically, as the land may be exposed to the winds from the sea or sheltered by winding fiords or mountains. In the latter case a short distance is often sufficient to change conditions surprisingly, as instanced above. As a rule therefore the places on the shore of the open sea have a considerably greater number of foggy days in summer than those inland. The influence of the orography is thus generally weaker at the mouths of the fiords; TURNER states for instance that fog rarely occurs in July and August as far inland as Fort Chimo. The same conditions have been observed at North West River.

In winter, when the rivers are about to freeze and the ice is tossed about by the tides, huge volumes of steam rise from the inky water and are spread over the land by the prevailing light winds. This steam becomes fog and is finally deposited on the bushes and trees as hoar-frost, greatly beautifying the scenery.

According to TURNER the cloudiness reaches its maximum in the spring and fall, the average being 82 % of the visible sky. For the coast, on the other hand, there are two frequency maxima: in May and November; see Fig. 150.

Mirages, Northern Lights and Magnetic disturbances.

The air of Labrador is so limpid that the summits of the mountains and the inequalities in their surface stand out against the clear sky with wonderful distinctness. In winter the atmosphere is extremely diaphanous all over the country, but also in summer the radiance and the light along the coast are so

brilliant at times that no artist could do them justice. In the interior, on the other hand, the air is almost hazy in summer and is often for long periods mingled with the blue smoke of forest fires, so that the view from an airplane can be very restricted. But there can also be days with a wonderfully clear atmosphere, bringing out marvellous effects of colour in the scenery, says Mrs. HUBBARD: the blue of the distant hills, the white of the reindeer moss, the dark green of the spruce forest, touched in places with the tender green of white birch and poplar! In the gloriously clear air of the coastal region visibility is sometimes 50 miles or more. The long twilight changes softly into night, and the moonlight may then be so clear that no light is needed for reading or making notes. The rise of the moon never fails to provoke a chorus of howling from the dogs in the village.

In the cold, clear atmosphere off the seaboard in summer the ships seem to pass strangely near. The most grandiose m i r a g e s appear over land and sea. Suddenly a confused, vibrating outline of vertical lines is formed which soon gather into an inverted image usually of an iceberg. Islets may assume the appearance of big islands, small rocky skerries appear now as pillars, now as mushroom-like formations with a disk-shaped top, or as flat, tabular ridges. Sometimes a third, upright picture appears above the inverted image (cf. 400). The islands of the archipelago in the neighbourhood of Nain may appear wonderfully magnified by mirage. Some of these displays are very striking; they may represent vessels one above the other, sometimes the ships seem to be cut horizontally in two parts with the sails in the intervening space. On the large expanses of water the mirages appear at the horizon: icebergs with their own reflections inverted above them, steep cliffs that dwindle and shrink. These pictures may appear, expand, dwindle and disappear within the space of a few minutes (761). On the other hand, some mirages remain for an hour. Towards evening these phenomena usually disappear.

The mirage is an important factor in navigation: when the experienced sailor observes a mirage behind the immense fields of pack-ice he is sure to find open water in that direction and accordingly tries to find a gap in the ice for the vessel to pass through.

A most captivating phenomenon is that termed N o r t h e r n L i g h t s. This 'searchlight of God' has much impressed the superstitious natives; when the display is at its height they imagine that the spirits dance and wave at them from the sky (p. 543 sqqq.). The Northern Lights are most brilliantly displayed in Labrador after dark at all seasons, provided the moon light does not neutralize them. Even in summer their effects are magnificent; for example

on the 26th and 27th of June, 1937, we had a glorious display of them from Dove Brook, extending about 40° to the south from the zenith. Strong and rather frequent magnetic storms seem to coincide with this phenomenon.

The capricious behaviour of the radio waves is conspicuous on the coast. Anyone who has travelled along the Labrador coast has experienced sudden disturbances in the radio connections. The Forbes Expedition in 1931 found that the signals often faded out in cloudy weather and sometimes in fair weather, especially just before the onset of a stormy spell (275). My own experience is that there is some kind of connection between this fading out and the aurora, which blazes with surprising brilliance even in the middle of June. We also found that the radio sendings and the compass disturbances were greatest when the Northern Lights were especially intensified. We are in Labrador rather near the northern magnetic pole.

For the isogones see Fig. 155.

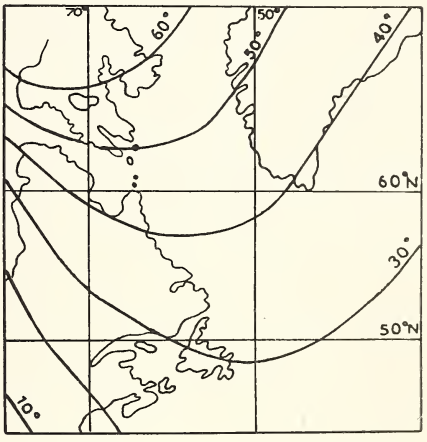


Fig. 155. The magnetic deviation (variation) in Labrador in 1937.

Climate and weather.

We have now to some extent familiarized ourselves with the climate of Labrador. By climate we understand the combination of the values of the climatic elements, temperature, precipitation, etc., characterizing the average conditions of the athmosphere at a given place. It should not be overlooked, however, that these mean values are meteorological abstractions only and, as has already been emphasized, that their average total is hardly ever found to apply to actual natural conditions. The geographical reality in nature is the w e a t h e r. By weather is understood a summary of the temporary values of the climatic elements, thus based on first-hand observations. Experience has shown that in some years a certain t y p e o f w e a t h e r predominates in Labrador, as in 1937, when in the coastal regions the summer was warm and sunny with few storms, whereas in another year the summer may be cold, foggy and stormy with 'dirty weather', as in 1939. In such years it is scarcely possible to believe that one is in the same place. It is not necessary to stay long in Labrador to learn by experience which of these two types will probably prevail during a certain year.

It is therefore easy to understand why the figures in the meteorological tables scarcely ever re-appear in the combinations for actual conditions. These average figures are obtained from years representing different types of weather: good and bad, rainy, foggy and stormy as well as dry, warm summers with comparatively calm weather.

The material at my disposal is not sufficiently comprehensive to enable me to give a description of the types of weather on Labrador beyond the facts already stated and the contributory meteorological conditions. It should be remembered that we are dealing with a country with a very varied morphology; its deeply incised fiords and valleys, its coastal islands and its plateaux rich in lakes are all unequally exposed to the meteorological factors: radiation, wind and rain. The tables above partly confirm this.

There may be some differences in summer in the weather of the northern and southern halves of the coast. In the south the weather fluctuations are apt to be sudden and freakish, whereas in the north they seem to occur in regular cycles (cf. 275). It is generally assumed by the local population that the Kiglapait Mts form a climatic divide especially noticeable in winter. Coming up from the snow-free coasts in the south in the autumn one is indeed surprised to find patches of snow from the preceding winter still lying in shady places on the Kiglapaits, and as one advances towards the north the patches grow larger and more frequent. However, this snow is principally due to local morphological conditions. There are no differences in the tables from the meteorological stations in Nain (south of Kiglapait) and Hebron (north of Kiglapait) to support the idea that a climatic divide exists between these places. On the contrary, the transition at sea level is slow and continuous all along the coast, both in temperature and precipitation.

The seasons.

It may be useful to dwell on the variableness and the main features of the seasonal development which will at the same time throw some light upon the weather periods (cf. 238).

During the winter months (cf. p. 299) Labrador is subjected to the influence of the great high pressure centre in Canada, from which air streams across the peninsula from directions between the west and the north. A cold, dry wind predominates by two-thirds over other winds. As a result of their origin, the westerly winds give rise to clear weather with biting frost and a cloudless sky. The farther north one goes the clearer the sky in winter and the less the velocity of the wind. Hopedale, which lies nearer the low pressure tracks has greater cloudiness and stronger winds. The precipitation is therefore rather small. Precipitation is greatest when the air pressure is low and calm prevails, or

more rarely with north or north-east winds. In Hopedale and Zoar there may be abundant precipitation also with south-west winds, which may be regarded as deflected south winds.

This weather prevails until the end of March, when the number of days with a precipitation above 1 mm as well as its amount begins to increase. After this time the precipitation is chiefly caused by cyclonal winds from north, north-east and east due to low pressures passing north over the Labrador Sea. Sometimes it happens that a low pressure sweeps over Hudson Bay, attracting north-easterly and easterly winds across Labrador.

In the early spring the distribution of air pressure changes. The Atlantic low pressure gradually loses its intensity and the country comes under the influence of the anti-cyclone over northern Canada. The north to north-westerly winds grow warmer with the heating of the interior. The difference in the air pressure decreases gradually. Now the moving cyclones begin to sweep further northwards in over the peninsula and thence onwards to the east; in May the temperature begins to rise fast. The northwest—south winds are then up to 10° warmer than the north-east winds. The warmest winds are the rather infrequent south winds.

In summer the air pressure variations are relatively less and the winds change more frequently than in winter. The greatest amount of precipitation and the lowest temperatures still coincide with north and north-east winds and with calm weather.

In October these conditions begin to change and the winter season gradually sets in. The high pressure in Canada and the north-west monsoon develop and are stabilized, the wind velocity increases, the west winds lose their warm character. The frequency of calm weather and westerly winds decreases, and consequently the cloudiness. This marks the beginning of the winter. — Cf. the tables pp. 310 and 312.

Comparison of Labrador with other regions.

We have found that Labrador presents some conspicuous climatic peculiarities.

One of these is the negative temperature anomaly, which is among the most remarkable in the northern hemisphere (cf. p. 299). In spite of its rather southern position, 51°—60° lat. N. Labrador is at every season considerably colder than for instance Fennoscandia at 56°—70° lat. N. Labrador's bad name is perhaps due to the often emphasized contrast between the peninsula and the British Isles in the same latitude (99); cf. p. 299. The coldest month

in Labrador is January. August is the warmest month (398 d), but even then the temperature does not reach the Fennoscandian level; the negative difference for Labrador is considerable.

Another climatic peculiarity is the instability of the weather in summer. The atmosphere is seldom calm. There may be days as fine as any beautiful high-summer day in southern latitudes, but the very next day may bring a spell of bad weather lasting a week. This is due to the position close to the shifting contact between the cold and dry polar air and the warm and moist tropical air, which meet at the so-called p o l a r f r o n t where the winds are released.

The thermo-dynamic systems of the two countries mentioned above, one on either side of the Atlantic, differ fundamentally both in the air and the sea. In Newfoundland-Labrador coast conditions may be termed the inverse reflection of those of the western Fennoscandian coast. The same holds good also for the oceanographic and the biological conditions. A comparison of the biological (cf. Fig. 156) and meteorological isolines on a map (Figs 144, 145, 148 and 149) show not only their close interrelation but also indicate their interdependence on the Labrador Current. On the one side we have the great heating regulating centre of the North Atlantic, the Gulf Stream and its continuation, the warm North Atlantic Current on the European coast, and on the other, off the American coast, we have the cooling apparatus, the icy Baffin Land Current and its continuation, the Labrador Current. If the functions of these two systems were suspended, the isotherms would be transported a thousand kilometers southward on the Fennoscandian coast and as much northward on the Labradorean.

The coastal climate of Labrador may be termed the antipode of that of Fennoscandia also in respect of the precipitation, the former being rather continental in type, the latter maritime. In summer the strip of tundra on the coast of Labrador suddenly functions as an unstable, transitional belt at the edge of the maritime climate of the Labrador Sea, whereas in winter the continental climate region then extends across the coastal ice fringe right out to the ocean.

In Europe the only parallel to the peculiar climatic system of eastern Labrador is found in the north of the Petshora district; cf. p. 413 in the following chapter.

The climate of the west coast of Greenland, for instance at the station Ivigtut (61° 12' lat. N), is not unlike that of Labrador except that the temperatures of the latter are lower throughout the year than those of the more

maritime Ivigtut (238), owing to the north-westerly winter monsoon and the Labrador Current.

On the other hand, in the trend of its temperature and the precipitation curves, Labrador has a fairly good analogy in the same latitude at the eastern coast of Asia (298, 238, 169). This is clearly revealed by a comparison of the temperatures at the station Zoar (59° 21' lat. N) and those of the Asiatic station Ochotsk (143° 17' long. W):

	Zoar	Ochotsk
January	— 21.9°	— 23.6°
July	+ 11.6°	+ 12.7°
August	+ 10.9°	+ 12.9°

We need not here concern ourselves with the fact that the Asiatic station is of a somewhat more pronounced continental type, with a somewhat lower winter temperature, a slightly higher summer temperature and a lower yearly precipitation than the Labrador station. It may be added that the climate of the forest region in Labrador is decidedly continental and sub-arctic (398), whereas the barren land is arctic, chiefly because of the great dryness of the air (157).

The Labrador coast is distinguished by its rather cold winters and comparatively cool summers. The spring is very cold, the autumn relatively warm (at the southern stations). The climate of the coastal region is intermediate between the maritime climate of south-western Greenland and the continental climate of the western shore of the Sea of Ochotsk.

* * *

For more detailed information concerning the climate of Labrador I refer the reader to the following works dealing more or less directly with the Labrador climate: Brooks (99), Coleman (157), Connor (169), Deutsche Seewarte (222 a, 752 a), Dunn (236), Döll (238), Gautier (307 a), Hann (398 a-d,) Hepworth (430), Kindle (523), Koeppe (529), Köppen (354 c), Low (588), Stafford Moores (in 469), Newfoundland and Labrador Pilot (680), Scherhag (829 b 1), Ch. Schott (830 a), G. Schott (831), Spiess (880 a), Supan (912), Tarr (923), de la Trobe (960), Uebe (971), Wheeler (1021) and an anonymous writer (1081, 1086). Moreover, notes are to be found here and there in the travellers' accounts listed in the bibliography.

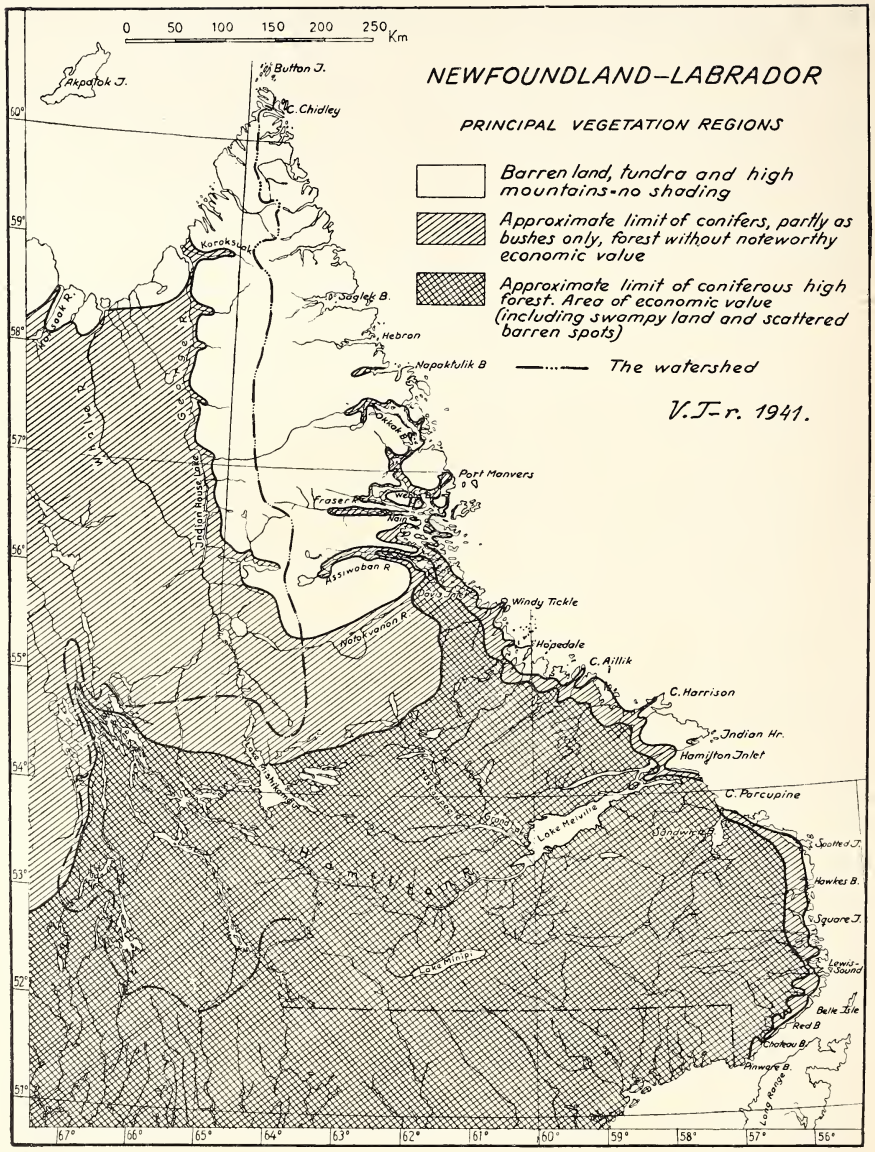


Fig. 156. The principal vegetation regions of Newfoundland-Labrador. — The mountain tundra and coastal tundra comprise 54,600 km²; the tundra forest, brushwood and scattered forest clumps 39,100 km², the forested area of economic value (including watercourses and mireland) 191,200 km². — Total area 284,900 km².

Part IV. The plant life.

The northern part of the Labrador peninsula belongs to the Arctic tundra zone, the Barren Grounds, and Labrador is moreover one of the most southerly of the countries including a connected Arctic vegetation. The southern limit of the Barren Grounds is determined by the tree-limit. Yet continuous forest does not grow until far south and west beyond the tree-limit; a transitional belt of varying width with separate trees or detached copses or brushwood is to be found between the tundra and the true forested land.

The principal vegetation regions and their geographical extension.

The principal physiognomical regions of vegetation in Labrador are shown in the small map, Fig. 156. Here an attempt has been made to draw roughly the tree-limit. This line indicates the limit of the area with thinned-out clumps of forest and groups spread up the sides of the hills, as well as single trees of black spruce (*Picea mariana*) or tamarack, (i.e. the American larch, *Larix laricina*) or both. In this area at the sea coasts are also included the most northerly bands of thickets higher than some 2 m; cf. Figs 157, 158 and 159. The deciduous trees here are of little importance and are almost absent. It is only natural that with our scanty knowledge of vegetation conditions and the extremely inadequate maps of Labrador which now exist much generalization was unavoidable in drawing this map.

In the present state of our knowledge the writer considers the tree-limit the only limit suitable for presenting the distribution of the vegetation, HUSTICH says (469); the latter should be divided horizontally and vertically into three regions: the bush region, the brushwood region, and the timber forest region. I agree with him. However, from a cartographical point of view it seems to me practically impossible to indicate on the available maps the boundary between the first two regions, because the bush and the brushwood are so intimately intermingled owing to the micromorphographical variations of the land surface that a topographical separation of these two regions is out of

the question. On the other hand, the horizontal distribution of the trees higher than 4 m and the brushwood between 2 and 4 m can be marked out by a somewhat schematic line, and it is this line, called by me the tree-line, which on the map separates the area of trees from the area without trees. In passing it may also be mentioned that the systematic classification of the complex forests of Labrador, including those of the coast as well as those inland, is no doubt a more intricate problem than we think in the present state of our knowledge (cf. SCHREPFER about the forests of Newfoundland). Such being the case, and considering moreover the need for a practical provisional classification of the vegetation, I have found the phenotypical division mentioned above the only possible one. This opinion I have expressed on my map of 1938 (914) and HUSTICH (469) agreed



Fig. 157 Brushwood at Hamilton Inlet (536 a).

in 1939, when he stated (p. 46) that if the forest limit on the east coast of Labrador is to be marked by one line only, the best thing seemed to be to take the eastern limit of the brushwood region.

In the north the forested area skirts the shore of Ungava Bay. Far to the north-west the limit is drawn according to information given by FLAHERTY (265), MCLEAN (618) and TURNER (965). This last writer gives a rather good account of the extension of the forests on the southern and western coasts of Ungava Bay: the northern limit of trees on the Labrador coast is in lat. 59°; here the conifers are stunted and straggling. Beyond the coastal range they stretch to a slightly higher altitude and continue dense to a point about 30 miles north of the mouth of the George River. On the western side of this mouth the trees are pushed back 15—20 miles from the sea. At the mouth of

the Whale River the trees grow to a height of 30 to 50 feet on the eastern bank and within 2 miles of the shore. By contrast, on the left bank the trees do not approach to within 10—15 miles of the shore. At the mouth of the False River they form a triangular extension and attain considerable size, owing in great measure to the peculiar formation of a huge amphitheatre, which affords admirable protection from the cold winds from the bay. On the western side of the False River the tree-line extends to the south-west



Fig. 158. Black spruce brushwood at Squash Run southward from Hawkes Island, looking from west-north-west. The levelling stick is 4 m long. Photo the author, August 1937.

across the Koksoak River and to the banks of the Leaf River almost at its source in the large lake. On the south side of this lake the trees are very much scattered and only inconsiderable in size, scarcely fit for anything but fuel. Farthest to the north the observations of Abbe (I) from the airplane confirm reports by McLean (610), Low (588), Wallace (995), Mrs. Hubbard (458), and Wheeler (1022) that the northern limit of the ecotone between forest and tundra lies a few miles north of the mouth of the George River in the lowlands west of the Torngak Mts. According to information given by an Eskimo to Hantsch (400), the farthest north thickets of black spruce are to be found at Ablorilik. In the neighbourhood of the Koroksuahk Brook (east-north-east from the George River Post), west of the notch which leads to the

head of Nakhvakarsuk Brook and Nachvak Bay, spruce trees were found by Wheeler (1022) up to about 600 feet above sea level; cf. Fig. 160. In the eastward drained valley there is nothing but willow. At the George River there is a very poor spruce forest; the tree-line on the right bank of the river stretches close under the hill away to the south-south-east. At some distance eastward from the George River are limited areas of a yellowish-green, grassy, meadow-like vegetation with occasional willow and alder thickets. Among the rolling



Fig. 159. Balsam spruce brushwood north of Cartwright in Sandwich Bay. The north-eastern side is dried up by the north-east winds. Looking from the north-north-east. Photo the author, June 1937.

hills of the lowlands west of the Torngaks this is replaced by a blue-green tone at the most protected heads of the lakes, and this may represent limited groves of conifers (1).

According to information given by Mrs. Hubbard (458), Cabot (119) and Hesket Prichard (758, 761) the tree-line runs more or less parallel to the Torngak Mts and the Atlantic coast. Just north of the Notaquanon River it seems finally to turn east and north-east and then to reach the Atlantic coast.

On the seaboard of the Atlantic the tree-line is very lobate, ending in some long tongues out into the valleys of the Assiwaban, the Fraser River, and the North (Okkak Bay) River. The northern limit on the ocean coast is

reached by the tree-line at Napartok Bay, the bay 20 miles south of Hebron (the determination of the tree-line is facilitated by the Eskimo appellatives *napartolik*, meaning clumps of forest) (528, 1021, 995, 475). Some small and sparse remains of forest are also to be found in the neighbourhood of Nutak. According to a report in Hebron there should be forest far inside the fiord south of this station, but this is contradicted by other reports (157), so it is omitted from the map. According to some reports which corresponded I must consider Napartok Bay as the most northerly wooded fiord at the Atlantic coast; it shoots in from the coast immediately north of the Kaumajet



Fig. 160. View down Koroksuahk Valley from near Long. 64° 40′ W (1022).

Mts. Further to the north the fuel is drift-wood; the coast is bare, the soil is too cold and the winds are too keen.

Available information makes it difficult to draw the tree-line out towards the Atlantic. The barren islands and bare headlands and the small size of the trees on the lower coast land have given a very false impression to the visitor who has not entered the interior of the country. Much of the land behind the Atlantic coast southwards from the Nain archipelago is not so scantily timbered about the heads of the bays and in the valleys. In both the north and the south parts of the districts south of Cape Mugford and especially in the latter, the rift-valley topography has sharpened the outlines of the slightly undulating country, and the morphological diversity is evidently favourable for the forest growth which finds shelter in the valleys. Its distribution, however, is very variable and our information regarding it very imperfect. The author has therefore been compelled to draw the limit more or less

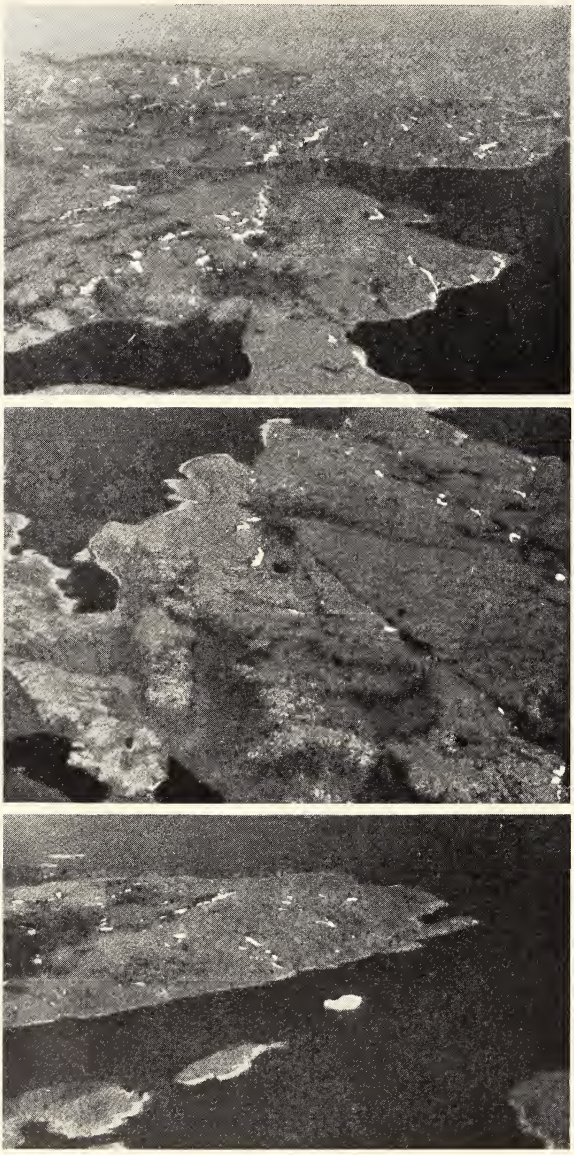


Fig. 161. The rocky surface of the south-eastern fringe of the Labrador peninsula; the dark patches in depressions and dells are matted thickets and brushwood of black spruce. a. Hawkes Harbour seen from south-south-west. b. The country 3.5 miles toward the north from Cape Bluff seen from the south. c. Cape Bluff from the west. Aerophoto the author, July 1939.

schematically. A great many corners shoot out from these connected forest areas towards the sea in the valley bottoms, and here and there are isolated remains of groups of trees even at the extreme coastal edge; cf. Figs 161 and 162.

At the south-eastern corner of the peninsula the spruce forest has thus forced its way right to the ocean shore, e.g. in Occasional Harbour, and on the steep northern side of Cape St. Michael; Fig. 166. Prostrate conifer-bushes, Figs 163 and 164, are to be found on the eastern cape of Square Island, brush of black spruce and balsam in sheltered places at Francis Bait (Fig. 165), Tub Harbour, Duck Harbour, and in places at Hawkes Harbour; on both sides of Squash Run, between the mainland and Hawkes Island, the black spruce forest is as much as 8 m high; some spruce patches also occur at Sandbanks.



Fig. 162. Black spruce forest restricted to the dells near Cape Aillik (469).

On the western side of Huntingdon Island very dense brushwood of black spruce grows around the hills; it is 1—2 m high and bright green in colour; and on the southern side, at the head of the bays, there is spruce forest 6—8 m high (469); round Cape Porcupine, between the North River and West Bay the open, sandy ocean shore is covered in many places with rather dense forests of black spruce 10—12 m high, and reaching down to the upper margin of the beach cliffs; Fig. 117. The horizontal timber line in the Hamilton Inlet district reaches approximately to Rigolet; Fig. 167. Yet at Saddle Island and the other larger islands in the Hamilton Inlet, the dwarf brushwood of black spruce has forced its way through clefts right to the sea shore. Both on these islands and on the mainland coast towards the north the thickets and patches of brushwood, 2—3 m, stretch upwards vertically about 30—40 m, after which the land is barren. On Pottles Hill (469) the somewhat dense brushwood 2—3 m high reaches some 50—100 m in a vertical direction, its upper margin being fringed by a belt of alder.

North of Hamilton Inlet single bushes of balsam fir and black spruce are to be found, the maximum height being 0.5 m on Smokey Island. At

Cape Harrison much dwarfed black spruce grows in the dells. On Adlavik Islands, Manak, Cape Strawberry, Makkovik Harbour, Aillik (Fig. 162) and Windy Tickle low spruce forest stretches down to the seaboard. At the Hopedale station the black spruce and larches in the old park are 10—12 m high (Fig. 168) indicating that the natural conditions are fairly tolerable for forest growth, but that the lack of forest on the outer coast must be to a great extent due to the depredations of the fishermen and the liveyeres (white planters). At Davis Inlet brushwood grows from the sea shore to a height of some 70 m up the hills; Fig. 265. The barren grounds are confined to the outermost islands and headlands which remain practically tree-less.



Fig. 163. Thickets of balsam spruce. Photo C.-G. WENNER, July 1939.

In the Nain archipelago the lower parts of the islands are more or less wooded but principally on the southern and sheltered western slopes as far as a schematic line from Pownal Island from a place north-east of Niatak to Hillsbury Island and the small bays along the eastern shore of Aulatsavik Island up to 56° 50′ N. Also a wooded tongue pushes out again to Port Manvers (Fig. 110 a) from the forest region round Webb's Bay (cf. the new chart No. 265).

On the southern side of Iglosoatalialuk, the great island west of the fairway between Dawes Island and Njakuk in Okkaks archipelago the black spruce forest stretches to within 0.5 km of the open sea; Fig. 184 a.

Thus forest growth is rather scarce at the open coast; fen land is lacking. This indicates that the climate here is so dry and windy that trees do not thrive except in some protected valleys. Seen from the sea, therefore, the coast appears almost completely woodless, but from the aeroplane quite a few strips of forest are seen in well-protected clefts and split valleys. South of Cape

Michael the extent of forest could scarcely be reckoned as more than 5 % of the surface area, north of that at 25 %; cf. Figs 161 a—c. Areas almost completely woodless are found on the outermost parts of the coast, like Cape Bluff and Square Island; Figs 14 and 15. Somewhat inland, as in the sound inside Hawkes Bay, the forest is of the worst kind, small and to a great extent dried-up. It is necessary to travel at least 5—10 miles into the land before connected forest and boggy land again begin to appear. Photographs of the outer coastland in the south-east, Fig. 17, illustrate the conditions. It has been impossible to draw in the small scale of this map of the tree-line such tongues as are described above.



Fig. 164. Spruce thicket, 1 m high, at Tub Harbour, Venison Tickle (469).

The taiga.

Within the tree-limit a broken line indicates the north and east limits of the area in which there is a forest proper with connected or more or less close clusters of trees. In drawing this the writer has followed partly his own observation and partly the information obtainable from the population of the area and from the literature. Such a line drawn must of course be extremely vague and the author was in great doubt as to whether he should publish it at all. It can, however, be taken as a provisional line, because, to show cartographically in a more detailed way the physiognomic vegetation types of Labrador will not be possible for a long time. From an aeroplane this primeval forest area, the taiga, appears to be very speckled, different types of woods, fens, and bogs alternating almost inextricably. Added to this the forest vegetation is distinguished by a very complicated phyto-geographical structure, due to the fact that varying forms and associations are closely intermingled and vary with the capricious terrain. Pure forest types of the kind known e.g. in Fennoscandia are as little met with in Labrador as in Newfoundland.

In general it can be said that, with the exception of a narrow strip along the Atlantic coast and the outermost part of the Straits of Belle Isle and the

few barren mountain ranges with their surroundings in the north, Newfoundland-Labrador is more or less clothed with forest.

The interior of the country, south of lat. 54° N, is fairly well covered by continuous forest, except where it is interrupted by some hill-tops and barren summits of the small mountain ranges south of that latitude; Fig. 169. In the northern part of this wooded area trees of some value are to be found only in the valleys and lowlands.

The tundra.

Beyond the tree-line the northern part of the peninsula around and east of the water-divide is chiefly covered by connected m o u n t a i n t u n d r a



Fig. 165. Raised beaches west from Francis Harbour. The man with the 4 m long levelling stick is standing on the highest beach at 67.7 m above sea level. In the foreground is seen the slight extension of the black spruce thickets. Photo the author, Aug. 1937.

with barren hills covered with moors and heaths or sterile fields of stones, while west of the hills lie the arctic tundra (Fig. 175) or b a r r e n g r o u n d s, as they are called in North America.

As already shown the tree-limit does not as a rule extend to the shore of the ocean in the east. Between them there is a narrow strip of barren land, including both islands and headlands, all along the coast from Naparktok Bay in the north to Pinware Bay on the northern shore of the Straits of Belle Isle in the south. In many places the strip is narrow or, as we saw above, broken up by patches of wood sometimes stretching even to the south side of many of the pushed-out islands. Yet, for reasons of method we shall here treat it as a unit and call it the c o a s t a l t u n d r a.

We will now take a hasty glance of the vegetation within these main physiognomical regions of vegetation.

Mountain tundra.

In the north is a confusion of towering, almost untrodden mountains rising more or less directly out of the sea and forming three isolated groups: the Torngak Mts, the Kaumajet Mts and the Kiglapait. The topography here is, like the geological structure, most varied (cf. p. 159). The edaphic factors originating in the soil and the topography as well as the climatic factors differ greatly and their resultant is very composite (218, 219).



Fig. 166. Spruce forest on the northern slope of Cape Michael (469).

The slope declivity is evidently of the utmost importance to the vegetation here; the nearer to a right angle the incidence of the sun's rays, the greater the heating power, the sooner the snow disappears and the slope dries up, so that vegetable life can start. Shelter from drying winds also greatly influences the composition and shape of the vegetation.

The nature of the subjacent rock is of special importance from a floristic point of view, but also for the composition of the communities and the vegetation as a whole. There can be a radical difference between the disintegration residuals in their capacity to absorb moisture and heat; the slates and schists have the most, whereas the water easily flows away from the broken diabase. The capacity of sand and clay to retain water is very different.

The degree of humidity of the soil and of the atmosphere is the factor that, more than any other, seems to influence the vegetation in this region. The farther north or the higher above the sea level a place is, the drier its climate, added to which the greater amount of precipitation is in the form of snow, often moved by the wind from place to place, and thus the vegetation at best only profits by it indirectly.

From the variable factors here mentioned and their combinations arises a

great number of peculiar physiognomical and sociological types of vegetation. Unfortunately, in Labrador the grouping of the species into communities of a definite characteristic composition is still practically unelaborated; the following account therefore should be regarded as provisional.

The edaphic and climatic conditions produce a continuous tundra vegetation almost everywhere in this region of Labrador, as was stated by DELABARRE. Yet there are considerable interruptions: summits of higher mountains, fields of frost-riven rocks, protruding rocks, and broken masses of rock from which the winds have removed almost all the soil, collections of water, etc. are inimical to any form of vegetable life. Yet in areas even only sparsely covered with soil struggling plants can manage to live. The number of individuals, even of mosses and lichens, is small and the species few. In these arctic areas of the peninsula cold and drought thus give the strangest appearance to the thin vegetation which here assumes the peculiar shape of the



Fig. 167. Looking south over The Narrows from a hill toward the north from Rigolet. In background to the left is the plateau esker (cf. p. 214). Photo ALEXANDER FORBES, July 9th 1939.

F e l l-f i e l d (*sensu* WARMING); cf. Figs 170 and 171. The substratum is never completely covered with vegetation. The plants grow singly often at great intervals but denser spots occur here and there in the shape of low, close tufts or cushions or rosettes, or low espalier shrubs with bent and gnarled branches; the substructure gives a grey or greyish-yellow tinge to the surface soil. The plants are low, stunted by cold and worn by the sand or mineral particles which the wind carries. Humus is not formed, the plant remains are swept away by the wind. The vegetation is composed by dwarf shrubs represented by *Empetrum, Cassiope tetragona, Loiseleuria, Rhododendron, Diapensia, Dryas, Salix glauca,* etc. The greater number of species are evergreen Ericaceae with xeromorphous leaves. Where the soil is somewhat more humid and where there is more shelter from the wind herbaceous plants are to be found: *Silene acaulis, Saxifraga oppositifolia, S. cernua, Cardamine bellidifolia, Arabis alpina, Draba* sp., *Campanula uniflora, Cerastium*

alpinum, Erigeron uniflorus, Oxyria, Pedicularis euphrasioides, Polygonum, Rhodiola (*Sedum roseum*) [1]), *Sibbaldia, Potentilla, Ranunculus, Juncus, Luzula, Carex rigida, Aira* (*Deschampsia*), *Festuca, Calamagrostis, Poa, Trisetum, Lycopodium, Equisetum.*

A striking feature mentioned by ABBOT is that on the lofty summits, e.g. belonging to the old peneplane (cf. p. 65 sqq.), only some few plant species are to be found. He notes the complete absence of vascular plants from the tops of the two highest mountains investigated by him, Mt Tetragona and 'X peak' in the Torngak Mts, where are only lichens and mosses. On the lower summits individual species of *Cassiope tetragona, C. hypnoides, Saxifraga rivularis, S. cernua, Cardamine bellidifolia, Papaver radicatum, Luzula spicata, Carex scirpoidea, Poa arctica, P. glauca, Hierochloë alpina, Lycopodium selago,* var. *appressum* etc. are to be met with (1).



Fig. 168. Looking toward the south over the 'park' at Hopedale (469).

On Mt. Faunce above 3300 feet DELABARRE noted the following species: *Cerastium alpinum, Draba fladnizensis, Saxifraga caespitosa, S. rivularis, S. nivalis, Papaver nudicaule* (*radicatum*), *Rhodiola* (*Sedum*) *roseum, Luzula confusa* and mosses: *Andreaea petrophila, Bryum* [?], *Pogonatum alpinum* or *urnigerum, P. capillare, Racomitrium lanuginosum,* and lichens: *Alectoria divergens, A. nigricans, Cetraria arctica, C. cucullata, Sphaerophorus coralloides, Stereocaulon denudatum, S. tomentosum, Theloschistes polycarpus* and *Umbilicaria proboscidea* (the famous *'tripe de roche'*).

The fell-field vegetation is to be found principally at high altitudes but occurs also at sea-level. Its composition varies much according to the exposure and humidity and moisture of soil. It is poor and desiccated on the high talus and on wind-swept plateaux and valleys. In sheltered, moist places it changes into meadow-like communities or rich moss- or lichen-heaths (see below).

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[1]) The synonyms in brackets are those in MARIE-VICTORIN'S Flore Laurentienne (628 b).

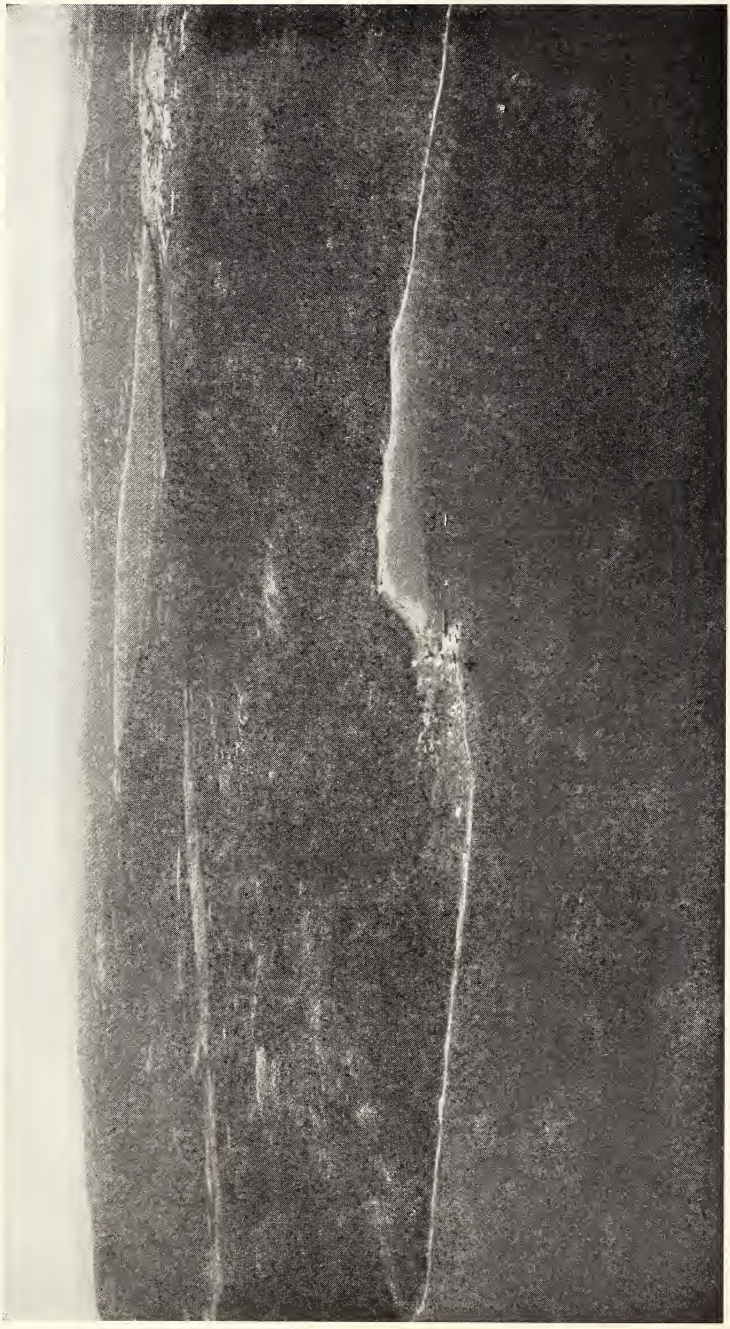


Fig. 169. Looking north-west over The Narrows (in the foreground) and the Hudson's Bay Company's trading-post Rigolet (above the cross) and Double Mer (in the background). The spruce forest is fairly continuous. Aerophoto the Forbes-Grenfell Expedition, 1931.

On somewhat sloping ground, in more sheltered places covered by snow in winter, the fell-field gives place to the d w a r f s h r u b h e a t h (Warming). This, unlike the fell-field, has a continous vegetation, the greater part of which consists of dwarf shrubs adapted to drought and forming a close carpet 25—30 cm high; a vegetation giving a green or brown tinge. On the often luxuriant sub-vegetation of mosses and lichens the same dwarf brushes occur as in the fell-field: *Empetrum, Vaccinium uliginosum, Betula nana, Salix glauca, Loiseleuria, Diapensia, Ledum latifolium* (prostrate), *Arctostaphylos alpina, Vaccinum vitis idaea* and *Linnaea.* At lower levels are dwarf birch, willows and juniper with interlaced branches, but always espalier in form; herbaceous plants also occur on more open places, but they do not form widespread patches, mosses fill the interspaces.

The more level the substratum the more uniform the heath-cover. On slopes and uneven land it is often interrupted and substituted by fell-fields or moors. Water rich in nutritive substance and oxygen makes the growth more luxuriant.

In many spots the sub-vegetation is practically dominant and develops an independent growth, forming either l i c h e n- o r m o s s-h e a t h (Warming) or a mixture of both, in many places gradually changing into peat-like sour humus, »r a w h u m u s»; cf. Figs 172 and 173. The higher their situation the more are the moss-tundra and lichen-tundra composed of crustaceous species; shrublike species there are not sufficiently hardy; yet in many places there is bare mineral soil at a high altitude, which is to a great extent moving under the influence of the redepositing power of the freezing and thawing processes. On more level terrain groups of s o i l p o l y g o n s about three feet in diameter are formed. On the slopes the s o l i f l u c t i o n assumes different forms (1, 1 a; cf. 912 b).

On such moving soils there is also a scanty vegetation; there is none in the active soil in the centre of these polygons, but at their edge a few hardy plants manage to maintain a foothold: for instance *Salix herbacea, Carex misandra, Draba nivalis, Cardamine bellidifolia,* etc. At higher levels these plants become however more and more rare. Where the slope is greater the polygon-fields are replaced by solifluction forming small, sluggish streams of muddy soil and there the plants disappear. At higher altitudes still, the naked rocks and the block-fields are in some places as bare as a city pavement, though in others the stones are covered with scanty *Gyrophorae.*

The snow cover is of extreme importance to the shape and composition of the vegetation. It forms in many places thick drifts in the hollows of the slopes.

At the edge of such snow drifts vegetation develops as the snow melts. These moist 'snow valleys' or 'snow-bank bottoms' form harsh, light-grey areas in the immediately adjacent landscape and their bottoms are only exposed when the summers are relatively mild. These valleys have however a scanty flora with *Salix herbacea, Cassiope hypnoides, Saxifraga, Koenigia islandica, Anthelia* and *Cesia;* at the lower part of them *Salix herbacea*-meadows are to be found in some places.



Fig. 170. The fell-field vegetation at 116.6 m above sea-level on the northern neck of Whale Island in the Nain district. Looking from the west. Cf. fig. 173. Photo the author July, 23rd 1939.

Thus what we have called the barren ubiquitous mountain tundra in the widest sense of the word does not represent an area of uniform vegetation; it involves many different plant communities varying with the altitude and surface forms which also have a visible influence on the distribution of fell-field and heath. Under favourable edaphic conditions, therefore, arctic-alpine vegetation is to be found at all heights above sea level, from the summits to the foot of the mountains, as already suggested.

In districts where the topographical contrasts are so great as in the three north-easterly mountain groups in Labrador, there are great contrasts also

in the character of the vegetation. The sight of dark mountain tops with patches of snow give the illusion of a mineral world without life — a forbidding contrast to the smiling, flowering surrounding zone on the moist south slopes at lower levels, where a life and death struggle for space is proceeding: the mineral world is attacking with the scree-floods far down the slopes, while the vegetable world shoots out green tongues like tentacles over the stony strips. A chaos of forms and associations has arisen in this fighting zone in accordance with the special conditions offered by the varying edaphic factors.



Fig. 171. The fell-field vegetation at 157.8 m above sea level west from Nutakk in the Okkak archipelago. Photo the author, July 1937.

At low altitudes, where the snow is longer absent and the vegetation period longer, there is a dense carpet of lichen-heath or moss-heath with xerophilous vascular plants on dry, rolling hills and drained, gentle slopes as on the remnants of the old peneplain in the Torngak and Kaumajet Mts: e.g. *Juncus trifidus, Hierochloë alpina, Luzula confusa, Betula nana, Empetrum, Vaccinium* and *Lycopodium selago*. The dwarf shrubs, where they occur, press their shoots against the soil like espalier plants and the highest of them can be measured in dm only; the wind desiccates and kills the shoots when not covered by snow in the winter. Only in hollows at a lower height do small copses of dwarf birch or willow occur.

On protruding rocky gravel-covered hummocks there is a scanty covering of more or less xerophilous pioneers among plants: *Oxytropis campestris, Viscaria alpina, Arctostaphylos alpina, Loiseleuria, Vaccinium uliginosum, V. vitis-idaea, Diapensia, Empetrum, Luzula spicata, Carex rigida, Calamagrostis neglecta,* dwarf willows, *Dicranum, Polytrichum strictum, Racomitrium lanuginosum* and *Umbilicaria.* In the moss-heath are to be found strewn *Pedicularis euphrasioides, P. flammea, P. lapponica* (scarce), *Vaccinium an-*



Fig. 172. Lichen- and moss-heath at Whale Island. About half the ground is covered with espalier patches of *Empetrum* some cm high and prostrate *Betula nana* runners (cf. p. 345). Photo the author, July 23rd 1939.

gustifolium (*pennsylvanicum* var.), *V. palustre* (*Oxycoccus*), *Phyllodoce coerulea, Rhododendron lapponicum, Cassiope tetragona, C. hypnoides,* etc. On the dead roots and branches of willows, dwarf birch and *Ericaceae* some moss species grow. Prostrate *Ledum latifolium* and grasses live on the edges of the bare patches where some soil has already been formed.

The moss- and lichen-heath is especially extensive on the rolling plateaux, which skirt the high mountains towards the west and south (cf. p. 64). No part is more rugged and inhospitable than these 'barrens' (Figs 23 and 24), the vast rolling plateau of the interior, broken by stunted groups of wind-torn trees only at the plateaux' edges upon the shores of the innumerable lakes and

beside the shallow rivers. On the main, stony plateaux dotted with boggy-land 2000 feet above sea level between the Upper George River and the Atlantic reigns an abominable mosquito-haunted desolation. According to PRICHARD (761) here are merely scattered patches of dwarf birch, a foot or two in height, the only fuel obtainable; the stems of them are no more than finger-thick, scarcely substantial enough for boiling a kettle. Upon the banks a few clumps of alder grow. Enough fire for warmth or cooking is impossible to get, no tent-poles can be found. On the slopes towards the east and west and in the hollows between are scattered patches of small black



Fig. 173. Moss-heath with prostrate *Betula nana* and *Arctostaphylos alpina* at 46.3 m above sea level on Whale Island. Looking towards the east. The neck in the background is the one shown in Fig. 170. Photo the author, July 23rd 1937.

spruce, birch, juniper, willow, and alder, the latter making the shores of the lake green down to the edge of the blue water; the steeper southern slopes are choked by thickly-growing alder shrubs.

Heath vegetation is also to be found in the larger mountain valleys at lower altitudes, lichen-heath on drier land, moss-heath on moister. From the Komaktovik valley, for instance, dense growths of dwarf birch, willow and alder are reported (692).

Higher up on the piedmont plateaux, where the power of the wind is greater, the vegetation becomes lighter and fell-field species are intermingled: *Cardamine bellidifolia, Papaver radicatum, Rhododendron, Cassiope tetragona, Salix herbacea, Carex misandra,* etc. The higher the level the lighter the vegetation. Where the snow is absent only for a short time, a harsh, light grey, stony soil

is to be found strewn with high arctic plants which begin to grow close to snow-banks melting very late or not at all.

On the other hand, where the soil is moist on the piedmont plateaux the heath gives place to a richer vegetation of entirely different composition, especially near running water rich in oxygen. Sunny slopes exposed to the south are naturally the most favourable, especially when watered by melting snow and protected from drying winds. A few days after the snow has melted they will be covered with numerous species of flowering plants. On the higher slopes in addition to those mentioned we may find: *Saxifraga caespitosa, S. nivalis, S. oppositifolia, Dryas integrifolia, Campanula rotundifolia, C. uniflora, Erigeron unalaschkensis, E. uniflorus, Antennaria hudsonica, A. angustata, Taraxacum lacernum, Crepis nana, Bartschia alpina, Pedicularis groenlandica, Rhinanthus groenlandicum, Veronica alpina, Oxyria digyna, Silene acaulis* var. *exscapa, Cerastium alpinum,* var. *lanatum, Polemonium, Arenaria verna,* var. *pubescens, A. sajanensis, Sagina nivalis, Gentiana nivalis, Anemone parviflora, Ranunculus pygmaeus, R. hyperboreus, Draba rupestris, D. nivalis, Arabis arenicola, etc., Salix herbacea, S. uva-ursi, S. vestita, S. anglorum, Carex capillaris, C. misandra, C. concolor, Luzula confusa, Phippsia algida, Trisetum spicatum* var. *Maidenii, Poa alpina, P. glauca, Festuca brachyphylla.* Cf. ABBE'S lists (1). Practically all the species which occur at a higher elevation here are either ubiquitous arctic forms or at least occur in the Arctic of eastern America.

At the borders of the piedmont plateaux at a somewhat lower altitude a still richer herbaceous flora appears including the hardy specimens occurring on the mountains with plants from a lower level. One finds here real miniature gardens of beauty arousing wonder and admiration. At lower elevations the amount of ground water increases because of the run-off from melting snow, whereas the summits will be increasingly dried by the prevailing wind from the northern quadrants. Thus on moist slopes in gullies and on scree-slopes the great majority of these plants occur, with the addition of such as thrive in moist habitats, namely *Woodsia ilvensis, W. glabella, Cystopteris fragilis, C. Baenitzi, Aira* (*Deschampsia*) *flexuosa montana, Festuca ovina vivipara, F. rubra, Poa cenisia, P. alpigena, P. glauca, Trisetum spicatum, Danthonia spicata, Conioselinum chinense, Scirpus caespitosus, Luzula arcuata, L. parviflora, L. multiflora, Juncus triglumis, Carex misandra, C. Macloviana, C. lagopina, C. capillaris, Salix vestita, S. uva-ursi, S. herbacea, S. reticulata, S. Waghornei* RYDB., *Tofieldia minima, Polygonum viviparum, Cerastium Beeringianum, C. cerastioides, C. alpinum, Arenaria verna,* var. *pubescens, A. groenlandica, A. sajanensis, Alsine* (*Arenaria*) *verna, A. biflora, Sagina*

saginoides, Ranunculus nivalis, R. Sabini, Viola labradorica, Astragalus alpinus, Castilleja acuminata, Epilobium latifolium, E. alpinum, Arabis alpina, Saxifraga stellaris, var. *comosa, S. aizoides, S. aizoon, S. cernua, S. rivularis, Parnassia Kotzebuei, P. parviflora, P. palustris, Potentilla nivea, P. emarginata, P. maculata, P. tridentata, Solidago multiradiata, Antennaria canescens, A. alpina, A. labradorica* Nutt. (?), *Gnaphalium supinum, Arnica terraenovae, A. alpina, Senecio discoideus, Taraxacum lacerum, T. croceum* coll., *Erigeron unalaschkensis* etc.

The richest flora is thus near sea level and includes all species found from the shore to the high summits. In Labrador, in contrast to Fennoscandia, there is thus no clear-cut altitudinal separation of the flora, the hardier species remaining on the high mountains. This is naturally due to the special environment, especially to the greater moisture on the lower slopes and the cooling effect of the ocean on the alternating moist, grassy valleys and dry, mossy ridges leading to the higher slopes.

In some spots on slight slopes a m e a d o w-l i k e vegetation is to be found forming, so to say, oases in the mountain tundra. Willow copses, 0.5—1 m in height, consisting almost wholly of *Salix glauca* are to be found at lower heights in sheltered places on sunny southern slopes, in valleys, or in hollows between mountains where there are rivulets. In dry places the copses are very open and often include low or prostrate willow shrubs; in winter they are covered with snow. On the other hand the willows grow more densely along the brooks and rivers. In the willow copses there is a herbaceous sub-vegetation with round cushions of green moss and between them *Alchemilla, Taraxacum, Arabis alpina, Luzula parviflora* and other grasses in some places. At the most protected heads of the many lakes yellowish-green, meadow-like areas are to be found, at lower elevations with willow patches and occasional thickets of alder.

Beyond where the willow copses come to an end stretches the sub-vegetation forming h e r b-f i e l d s o r g r a s s-f i e l d s (Warming), according to the nature of the substratum; the former on sloping, turfy substratum on mountain sides facing south, especially where the soil is constantly being moistened. On more level ground or less steep mountain-sides the grass-fields contain *Carices, Poa, Calamagrostis neglecta, Eriophorum,* etc.; dwarf-shrubs are to be found on both.

On flat bottoms in river valleys and on their deltas the alluvial plains, especially the large ones, are almost covered by m e a d o w s with *Juncus, Eriophorum, Carices,* and grasses up to 50 cm high. In the lower parts these

meadows change into fens, cf. Fig. 174: *Carex*-fens, with a quite continuous vegetation, or in extremely moist places *Eriophorum angustifolium*- and *Scheuchzeri*-fens with *Menyanthes*. Fens (cf. p. 397 sq., note) prevail because of the very moist soil.

The knolled swampy arctic tundra, where spongy earth with water holes alternates with heath, is especially to be found towards the shores of Ungava Bay, but is also found sometimes in the skerry fence of the ocean coast; cf. Fig. 175. The soil of the tundra is probably partly frozen all the year round, at least the hummocks of the bogs — muskegs — were found ice-edged late in the summer. No higher vegetation can thrive under such conditions, it would dry up; only hardy dwarf birch scrub and willow species can



Fig. 174. Tundra with mud flats towards the south-west from the anchorage at Ford's Harbour in the Nain district. Photo the author, July 23rd 1939.

survive. But when the upper surface of the earth has thawed in the summer some flowering plants shoot up in the damper patches and blossom even while the snow still lies close by.

The mountain tundra on the Killinek far away in the north of Newfoundland-Labrador is wholly arctic in type, being almost devoid of connected vegetation except for some characteristic flowering plants, mosses and lichens; this tract can be regarded as a transition type from mountain-tundra to coastal-tundra (p. 359); cf. Figs 31, 32, 79, 80. The land looks grey and barren, and from the sea one sees nothing but grey rocks, giving the impression of complete sterility; life finds but little hospitality on these slopes. Yet even here sporadic small patches of the most meagre and hardiest plants lie in the clefts and hollows; according to HANTSCH (400), a blade of grass scarcely grows more than 15 cm. In the damp depressions between the extensive smooth rock-surfaces and in clefts from which the hurricanes have not yet carried all the earth, mosses and grasses, as well as

some variegated flowers, have found a foothold; scattered low-lying bushes are rarely as high as 20 cm, but their branches, though no thicker than a lead pencil, are highly valued as fuel. A little higher up grow tufts of lichen and stunted herbaceous plants. Already at comparatively low levels vegetation gives way to rocks and fields of boulders.

As this part of the peninsula faces the ocean, which is ice-free only some months, the vegetation comes to life first at the end of June or in July. In



Fig. 175. The knotted swampy arctic tundra at the southern shore of the bay towards the south from the anchorage at Ford's Harbour in the Nain district. Photo the author, July 23rd 1939.

July, however, it begins to advance very rapidly, reaching its zenith at the end of the month. In spite of the shortness of this period the berries on e.g. *Arctostaphylos alpina* ripen at Killinek. During the summer the mountain tundra exposed to the wind would be splendid pasture for tame reindeer, partly because of its wealth of fresh grass and plants and its cool winds which blow away the mosquitoes.

A phytogeographical problem of the mountain tundra.

Among the surprises of Labrador the association of the alpine and partially sub-alpine flora was one of the greatest. It was apparent in nature and the

list of plants given here to some extent confirms the fact that the dominating associations are almost exactly like those in Fennoscandia under the same edaphic conditions, not only in physiognomy but also in respect of the floral compositions. One could imagine oneself in West Finnmark's coastal districts when walking among the hills round Hebron; apart from the very few American species lacking in Fennoscandia's alpine flora, it is astonishing to find the composition of the dominating communities on the bare hills and the tundra corresponding almost completely to those in Fennoscandia. Even many of the rarities of Fennoscandia's alpine flora are to be found in the Kaumajet and Torngak Mts; cf. the lists above. The surprise is the greater when one remembers the great differences existing in the forest floras of both countries (see later). I have many times asked myself: does this not indicate that the similarities were still greater in former times, perhaps even that identity prevailed. It is not possible now to decide how far resemblance once extended in the forest areas; its divergence at the present day may be due to the fact that substitution by the American flora elements has been more active in Labrador's forests than in the mountain flora. In these circumstances it has not been difficult to understand the ideas of Boule, Vignand, Wegener and others that a North Atlantic continent connected Greenland with America and with the British Isles and Fennoscandia during a period which geologically is not so very distant (the older Quaternary perhaps).

In the flora of north-eastern Labrador are, however, some unusually interesting species. The immigration of those forms is one of the most captivating problems of the mountain tundra.

On the one hand two plants have been found in the Torngak Mts — *Cassiope tetragona* and *Antennaria angustata* — which are not known in western America but of which the former is widely dispersed in the arctic region, and also in Eurasia. They must have immigrated in late-Glacial time.

On the other hand nearer the sea level some other rare plants have been found: *Arenaria humifusa, Carex filifolia, Pedicularis groenlandica* Z., *Petasites sagittata, Crepis nana, Danthonia intermedia, Aster foliaceus* var. *frondeus* and *Draba Sornborgeri, D. stenloba* Ledeb., *Salix vestita, Arenaria cylindrocarpa, Astragalus eucosmus, Epilobium Drummondii, Senecio pauciflorus,* etc. These stand out as having a disrupted range, and according to Fernald have clear affinity with cordilleran plants. He thinks they must be considered relics of an older flora settled in these regions before the last general glaciation (Wisconsin) and 'hibernated' there during that period on nunatakks, i.e. mountain tops that rose above the inland-ice.

Moreover *Arnica Sornborgeri* Fernald, *plantaginea* Pursh., *Antennaria*

Sornborgeri, FERNALD, *A. pygmaea* FERNALD, *A. isolepsis* GREENE, *A. burwellensis* MALTE, *A. congesta* MALTE, *Taraxacum torngatense* FERNALD, *Draba Sornborgeri* FERNALD and *Poa labradorica* STEUDEL are considered as endemics in north-eastern Labrador. Cf. ABBE (1, 1 a) and FERNALD (258, 259, 260).

FERNALD (258) pointed out in 1925 that no trained systematic botanist had visited that region, but the collections made by the Moravian Brethren, and by SORNBORGER, BELL, DELABARRE and others had given a good general knowledge of the region. The Torngak region was found to stand apart from the rest of the Labrador Peninsula on account of the cordilleran species isolated there. Also the endemics to the Torngak region have affinities with cordilleran plants. FERNALD also predicted a considerable flora of cordilleran type awaiting the trained botanist who can spend several seasons in the Torngak Mts.

Now, it is of great significance to note that wide areas in north-eastern America, supposed »driftless», are occupied largely by plants of the Cordillera or Pacific America or by endemic allies of them; in 1925 FERNALD named 160 known species. They occur generally distributed over the Arctic archipelago and they often follow the Cordillera to Alberta or Colorado or are known in the North only in Alaska. The Arctic archipelago was uplifted in pleistocene time and formed continuous land confluent with the present North American continent, and the geological opinion is that it was outside the area covered by the glacial-sheets of America, as only local valley-glaciers can have occurred in this rather arid region. As it escaped Pleistocene glaciation the plants mentioned found a refuge there, and thence they migrated southward, long before the last glacial advance in eastern America, and occupied the places where they now are. Such plants of the old arctic flora, however, have failed to invade the regions which were denuded by the Wisconsin land-ice. The younger flora, which once invaded the glaciated districts off the coast, the plain or banks above the sea-level at the close of the glaciation, but were submerged in post-glacial time show no such restriction; these coastal plain types, only recently derived from the south, being aggressive, invaded the alpine regions as well as the youthful soils of the glaciated area, and returned so to say to their old home after the waning of the land-ice. This difference in behaviour is thus interpreted by FERNALD: the recent arrivals are young and have the attributes of youth, aggressiveness and pioneering vigour. In contrast, the western and endemic plants of the supposed »driftless areas» are old and have long since passed their period of aggressiveness. Left undisturbed they persist in their old habitats but they fail to move into new and immediately neighbouring territory. It is, therefore, concluded that the distinctive plants of the supposed »driftless areas» in north-eastern America outlived the Pleistocene,

and that their absence from the glaciated areas is due in the first place to their extinction; in the second, to the fact that they are so ancient and conservative that they have failed to occupy the recently available lands which lie between their now isolated refuges (258).

Fernald's idea is in principle the same as the interpretation of the plant-historical problem of e.g. the alpine plants with bicentrical distribution in Fennoscandia by Blytt, Wille, Th. C. E. Fries and others. This tempting thought has, however, not passed unchallenged either in Fennoscandia or Labrador.

The existence of nunatakks in Labrador at the height of the last glaciation is a geological question. Most recent research throws doubt upon the existence of such ice-free surfaces, even very small, at that time as the botanists assume, and it also appears to be geologically impossible, as the whole of Labrador is presumed to have been covered with ice during the Wisconsin glaciation. It was at that time perhaps more like the Antarctic continent of our day, where flowering plants are unknown in the explored regions, and not like the present coast of Greenland with its nunatakk flora.

Let us now consider the opinion of the botanist who has investigated these mountains — Abbe (1, a). During his research in northernmost Labrador he found that the flora of the higher mountains contained many of the same species as the nunatakks of Greenland, and like them represented essentially its hardiest members rather than a separate alpine or cordilleran element. And, as with the Greenland flora, it seems unlikely that any less hardy plants could have survived the last glaciation on nunatakks, if they existed, which the geologist Odell, who was with Abbe, does not believe (cf. p. 184). But supposing there were nunatakks, their climate would probably have been even more severe, drier and colder, than that of the mountain tops to-day; and this reduces still further the chances of survival at these latitudes of any but the hardiest plants. However, Abbe adds, it may be expected that some of the relics and endemics mentioned will ultimately be found on the exposed and sterile higher parts of the mountains. But in the light of the comparison with the nunatakks of Greenland and the likelihood of more severe climatic conditions during the last glaciation, it seems improbable that the ice-surrounded, well-drained, and wind-exposed nunatakks — if such there were — would have been havens for plants which even to-day do not grow in habitats of this nature in northernmost Labrador, concludes Abbe.

Now there is another possibility: ice-free land may have occurred off the present Atlantic coast during the last Ice Age. On the one hand we must remember that the down-warping of the earth's crust in the centre of the glacia-

ted Laurentian area, due to the weight of the ice cap, caused an up-warping of its peripheral fringe and the adjacent extra-marginal area (cf. p. 229 sqq.). On the other hand, the assimilation of water from the oceans with the inland-ice caused a lowering of the ocean surface. The exact rate of these changes in level is open to question, but it is not impossible that their combined effect brought about the rising of a series of islands above the sea level. This would then have been the 'hibernating' site of the supposed plant relics and they would then have migrated inland again as the inland-ice withdrew. Yet, when we consider both the general topographical conditions on the Labrador coast and the declivities of the inland-ice surfaces at the edge of existing and former glaciated areas it is not very likely that such a coast-wise ice-free foreland or a fringe of low islands could have escaped being wholly drowned beneath the inland-ice, if once the high mountains were overridden by it. In that case all the land of Labrador out to the edge of the continental shelf was completely covered by the inland-ice at the height of the last glaciation.

ABBE previously (1936) preferred the theory that the »cordilleran relics» survived in protected habitats of relatively low altitude at or near the places where they are found to-day. The local effects of direct insolation on southern slopes must naturally be considered when looking for the habitat of these plants. In areas protected from cold winds in summer and sufficiently snow-covered in winter to prevent desiccation, where sunlight falls nearly perpendicular and meltwater runs through the soil, it is not inconceivable that plants survived the Wisconsin age. Perhaps ABBE could have taken as an example the rather favorable climatic conditions existing at the upper end of the big valleys in Greenland, near the margin of the inland-ice. However, the results of geological research must not be ignored. Therefore, so much the less can I agree with the opinion that the habitat of the surviving critical plants during the Wisconsin epoch was the heads of the fiords.

In the light of present knowledge ABBE (1938) seems no longer to consider seriously the possibility of such refuges for plant life in the Torngak Mts.

This being so, a third alternative suggests itself. FERNALD has demonstrated a correlation between the present »cordilleran» relics and the absence of glaciation during the Wisconsin period in the supposed southern nunatakk and driftless areas in the Gulf of St. Lawrence region. Since Labrador was completely drowned under the inland-ice the entire flora must have been forced to migrate elsewhere as the glaciation advanced instead of the cordilleran plants persisting in situ during the Wisconsin. There may then have been an immigration of plants into north-eastern Labrador of a contingent from the

relic floras of those driftless areas during a post-Glacial warmer epoch more favourable for these plants.

Pollen analysis in Canada (e.g..22 a, 22 b, 846 a, 846 b, 846 c, 97 a) has given clear-cut evidence regarding the main lines of the development of vegetation and flora in these regions. In the older peat beds from the post-Glacial period, there is a predominant maximum of *Picea* sp. and *Abies.* In the middle of these beds the spruce has disappeared, especially in the bogs farther from the coast, and its place is taken by quantities of the more precious species of trees, *Juglans,* etc. In the upper beds there is again a very high percentage of spruce. In its main features the post-Glacial period can thus be divided into three sub-epochs: an old one with a continental climate, a climatic optimum, and a subsequent rather weak degeneration of the climatic conditions. The increasing continentalization of the youngest sub-epoch is distinguished by the increasing effects of drying and regelation phenomena. On the surface of the bogs, however, the effect has been observed of slight ameliorations of the climate during the last decades.

It should also be taken into consideration that in Vaigat District in Greenland, at about 70° lat. N, remains of bivalves occur which at the present time are not to be found in Greenland, their northern boundary now being at St. Lawrence Gulf (Ad. S. Jensen, 1905). These bivalves are indubitably evidence of a warmer post-Glacial period; at a later period the species were driven farther south. Cf. (16 c).

There have thus existed possibilities for immigration during post-Glacial time. The subsequent refrigeration leading to our present climate would have caused a localization of the relic forms to their relatively rare habitats of today, says Abbe. The problem of the endemics he seems to consider as a rather secondary one.

Different objections to Fernald's hypothesis are possible (cf. Simmons, 1913; cf. Odell, p. 184), but we have no reason to take them up for discussion here. I wish only to point out that other, similarly ancient and conservative supposed plants in Fennoscandia have not failed to occupy recently in post-Glacial time the land glaciated in the Wisconsin epoch (cf. Tanner in Geolog. Fören. i Stockholm Förhandl., Vol. 59 (1937), p. 97; and ibid., Vol. 62 (1940), p. 361). The manner in which the different species have been able to immigrate is a problem which in many cases is by no means easy to solve: whether by the agency of water, wind or animals.

It seems therefore not very probable that the flora of Labrador has partly survived the last Ice Age *in situ*, especially the southern element. Yet the manner of the post-Glacial immigration of 'cordilleran' plants cannot be considered solved until much more is known of Labrador's flora, pollen analysis has been made, etc. With it the floristic history of the peninsula must remain one of the problems for the years to come (cf. p. 416). I will repeat my opinion that valuable information bearing on this problem could be most easily obtained by a botanist working in collaboration with a geologist (cf. 275).

The coastal tundra.

We shall now consider the belt of pseudo-arctic vegetation which creeps along the Atlantic coast between the forests and the ocean southward from the mountain-tundra in the north away to the Straits of Belle Isle in the south. This c o a s t a l t u n d r a belt is broken in many places, but is mostly open country with no forest. The highest growths on it are stunted conifers forming in sheltered spots dense dwarfed thickets and low brushwood. Plant formations distinctly xerophilous in character are frequent with carpets of mosses and lichen. Nearer the ocean and on the hill summits the covering is very incomplete, and where the effect of the windy climate on the vegetation is greatest only widely separated patches of vegetation are to be found. On the farther, seaward side of the numerous islands lining the coast there is little trace of vegetation — only some mosses and lichens in crevices. Low willow and matted dwarf birch are the sole and very precarious source of fuel in this neighbourhood. On the other hand, in some very small, favourable spots a few more exacting plant communities grow; patches of grass edge the brooks and the sheltered shores of the bays, and in the depressions is a dense growth of willow brush with undergrowth of carices.

Yet, here also many kinds of arctic plants are to be found; thinly scattered in the westerly and southerly parts of the zone their number and importance increase towards the ocean and northwards as well as towards higher altitudes. The fell-field is to be found at sea level on the outer islands of the skerry fence and on the highest summits and plateaus. In favourable spots the dwarf-shrub heath is met up to levels of several hundred meters. But the moss- and lichen-heaths rival the fell-field at all levels nearer the coast; the worse the conditions for vegetation, the poorer the heath.

This narrow region covers nearly seven degrees of latitude and the composition of its vegetation consequently varies considerably in the direction of the meridian: in the south it is most coherent and contains many species, but the farther north we go the poorer and more stunted it is (218, 219).

It is not easy to mark off this vegetation belt from the wooded area. In the northern part it dominates both mainland and islands beyond the stunted outposts of the forests which are here fairly coherent; cf. for instance the new chart No. 265 of the Nain Archipelago. In the southern part a delimitation is difficult because of the dissected topography and the unconnected vegetation (cf. p. 335 sqq.). At Black Bay in the Straits of Belle Isle forests of black spruce mixed with balsam spruce send a broad tongue to the very shore of the sea. Towards the north-east, half-way between Black Bay and Chateau Bay, the coastal tundra with dwarf birch, *Diapensia, Trisetum* etc. forms a narrow belt which from the cooled sea shore reaches up to about 25 vertical meters above it, where it gives place to closely intertwined, knee-high, entangling carpets of a mixture of black spruce, balsam spruce, and birch forming the outposts of the wooded area. From the mouth of Pinware River to the west it may be considered that the coniferous forest region dominates the coast of the Gulf of St. Lawrence. Thus about here should be placed the quite undeterminable, southern limit of the pseudo-arctic vegetation strip; the district lies at about the latitude of London but at the shore it is distinguished by a climate nearly corresponding to Linhammar's at Finland's arctic coast (at Belle Isle: January —13°, July + 10°).

I have tried to show on the map, Fig. 156, with as much detail as possible the extension of the forestless, pseudo-arctic coastal belt. It has been impossible to avoid schematization, because it is broken into many parts even on the summer-cool, misty and storm-swept Atlantic coast by the forested land, which creeps forward in many places over the coastal tundra right down to the ocean shore even in such places where there are no islands; cf. p. 337 sq.

Comparing this with the older maps it appears that the width and importance of the pseudo-arctic belt has been much exaggerated even in the scientific literature.

Some indications concerning the complex floristic composition of the coastal tundra.

I have called the vegetable life on the forestless strips near the Atlantic pseudo-arctic because for the most part it has neither the floristic composition of forest regions nor any purely arctic character. In most parts the great types of vegetation are intermingled: the flora of spruce woods in a temperate climate prevail in the more wind-protected and warmer places, while the arctic flora of the tundra is to be found in the more exposed, colder spots. In this way the outer coast margin with its low

temperature and frequent fogs bears the stamp of the tundra communities more than that of the borderland of the wooded area.

On Whale Island (56° 31′ N lat., 61° 8′ W long.) in Nain Archipelago's outer skerry fence I found some examples of lichen- and moss-heath vegetation (cf. Fig. 173): On the most wind-swept, flat surfaces at lower levels about half the ground was covered with espalier patches of *Empetrum* some cm high or with prostrate *Betula nana* runners, while the other half was practically bare, mineral earth; Fig. 172. Scattered among *Empetrum* were *Arctostaphylos alpina, Vaccinium uliginosum,* single prostrate *Ledum,* among the *Betula* runners mosses and lichens, *Cetraria islandica, C. nivalis, Cladonia alpestris* and *Stereocaulon,* and on some frost-loosened places *Alectoria* and *Ochrolechia.* It is therefore a heath of mosses, lichens and scrubs of the type ubiquitous in Fennoscandia. In some of the hollows on this heath isolated black spruce can be found; prostrate and espalier they sometimes form copses up to 0.5 m high, growing upright where there is less wind.

On the almost horizontal open northern neck at 116.6 m above sea level we find again sparse fell-field vegetation, Fig. 170, the mineral soil appearing here and there between tufts and rosettes of herbs. Scattered clumps of *Racomitrium* and *Polytrichum* mixed with *Cetraria nivalis* and *C. islandica, Cladonia alpestris, Ochrolechia* and *Stereocaulon paschale* form a torn vegetation, a kind of substratum, and here interspersed are *Carex rigida, Anthoxanthum* and *Deschampsia,* prostrate *Ledum* and *Arctostaphylos alpina,* with espalier, *Betula nana* a few cm high. Here and there are scattered patches with *Loiseleuria, Diapensia, Vaccinium uliginosum, V. vitis-idaea* and *Oxytropis campestris;* on some damper spots patches of *Salix herbacea, Silene acaulis, Pedicularis euphrasioides, Pinguicula, Tofieldia, Rhodiola* (*Sedum roseum*), *Antennaria* sp., *Carex concolor* and other carices and *Lycopodium.*

On the gentle slope hence westward (in the background on Fig. 173) where the moisture in the soil increases, this vegetation gives place to a mossy dwarf shrub heath with herbs and low shrubs: *Phyllodoce, Salix glauca, S. argyrocarpa, S. vestita, Bartschia, Viola* sp., *Epilobium angustifolium, Astragalus alpinus.* At the lower end of the slope were found *Hierochloë borealis, Eriophorum Scheuchzeri, Cornus canadensis, Tofieldia, Castilleja* and solitary *Dryas integrifolia.*

From Ford Habour at 56° 30′ N. lat. from a seemingly corresponding locality DELABARRE has reported the following species: *Arenaria groenlandica, Silene acaulis, Astragalus alpinus, Oxytropis, Saxifraga groenlandica* (*cæspitosa*), *Epilobium latifolium, Antennaria* sp., *Solidago multiradiata,* var. *scopulorum, Taraxacum* sp., *Pyrola grandiflora, Vaccinium uliginosum, Koenigia islan-*

dica, Salix herbacea, S. uva-ursi, Festuca rubra, Hierochloë alpina, Carex rigida, Lycopodium, Polytrichum commune. There is no doubt that here we have a pure tundra flora-vegetation with all its subdivisions conditioned by the climate.

On the other hand the occurrence in the green sward and on the heath of such species as *Comandra livida, Trientalis americana* (*borealis*), *Majanthemum canadense, Vaccinium pennsylvanicum* (*angustifolium*), *Viola blanda, Solidago macrophylla,* etc. can support the idea that the bare strips in such places may equally well be regarded as a transitional formation of forest as of tundra. The cooling but also mainly drying influence of the winds and the Labrador Current makes the trees even in sheltered places undersized and stunted with short shoots and close-set branches, but on open land it completely prevents tree growth and forest formation. However, remnants of plants from the undergrowth are still there.



Fig. 176. *Dryas integrifolia* living on shell sand close to the sea level at Indian Harbour. Photo C.-G. Wenner, July 10th 1939.

Delabarre's notes made on the spot show the complex character of the flora: at Pottle's Bay, at 54° 25′ on sandy places in the most exposed situation he noted *Arctostaphylos alpina, Empetrum, Juniperus communis,* brush of *Picea mariana* and *Betula glandulosa.* In the more sunny and protected places were: *Rubus arcticus, Potentilla tridentata, Taraxacum* sp., *Polygonum viviparum;* in both but mainly in the more exposed: *Cerastium alpinum, Vaccinium vitis-idaea,* var. *minor, Rhinanthus, Salix Brownii;* in both but mainly in the more protected: *Draba incana, Coelopleurum actaeifolium* (*lucidum*), *Cornus canadensis, Achillaea millefolium, Solidago macrophylla* and fine thin grass; in both equally: *Stellaria longipes, Lathyrus maritimus, Rhodiola* (*Sedum roseum*), *Elymus, Poa pratensis, Tortula ruralis, Brachythecium, Hylocomium splendens.*

A curious mixture of these two flora types can be found. The species *Comandra, Trientalis, Cornus* and *Orchidae* of spruce forests I found growing in some places side by side with e.g. *Diapensia* and *Loiseleuria, Carex rigida* and other subalpine xerophiles, for instance on the little Stag Island out in the

ocean east of Cape Porcupine; the explanation may be partly the fact that off the Indian Harbour archipelago the Labrador Current with its ice-floes until the beginning of July and icebergs throughout the rest of the summer is forced out into the sea, so that the somewhat warmer, land drainage water from Lake Melville sometimes flows out over the surface round the island, and the influence of the cold current is modified during the vegetation period.

Conditions are very different in places where the shore is directly washed by the Labrador Current, for there are to be found representatives of the true, arctic-alpine flora. At Indian Harbour, on the south-eastern shore, close to the ocean there is a complex of small patches of *Salix herbacea* meadows in which *Dryas integrifolia, Saxifraga oppositifolia, Salix reticulata* with other purely arctic species thrive splendidly. This fact is certainly in some cases due to specially favourable edaphic conditions; for example *Dryas* and *Saxifraga aizoides, S. oppositifolia* and others are in many cases clearly dependent on the occurrence of lime, sometimes as nests and veins in the basic rocks and sometimes and especially, as beds of subfossil shells in the soil, cf. Fig. 176. The selective effect of the underlying rock and soil is clearly important, especially in countries with basic rock, as at higher levels at Indian Harbour. Close to the sea, however, it is certain that temperature conditions prevent forest growth to the same extent as they favour the arctic flora; there even the dwarf birch has an uncertain struggle for life. It is illuminating that one can meet the *Betula nana* in prostrate bushes some cm high on islands farthest out towards the ocean. It seems to creep towards the south; the root dies and then the stems, but the branches have formed new roots and life seems to advance laboriously over the meagre beds of lichen with *Empetrum* towards the south, trying to catch as much as possible of the life-giving sun's rays.

Among the many astonishing conditions here is the inversion of the vertical distribution of the vegetation belts, as already shown from the eastern part of the Straits (p. 360). The reason is obvious: the cold Labrador Current bathing its shores brings with it, as stated above, ice-floes until the end of July and icebergs throughout the rest of the summer, and the effect of the bleak winds from above the cold current is evident both in the inversion and in the impoverished flora of the coastal tundra. These conditions are also clear from the fact that, when in July the snow on the heights has completely melted enormous masses of it still lie for a time on the seashore, cf. Fig. 249; yet only a few snow drifts linger on the coastal tundra from winter to winter.

Vegetation types.

The rocky islands of Labrador, its headlands, and its coastal mountains consist of impermeable, eruptive or metamorphic rocks and the soil is rather thin. The drainage therefore is generally too good to allow vascular plants to live. On the other hand xerophilous lichens and mosses thrive well so that by far the greater part of the land surface is covered by an extremely xerophilous moss- and lichen-heath. This xerophile impress on the vegetation of the islands so near the ocean is somewhat surprising; the violent, dry winds (cf. p. 367) may be an essential cause.

With the heaths, however, in more or less sheltered spots is mixed up



Fig. 177. The devastated and partly cut down tree-growth on the northern slope toward the south from the anchorage at Ford's Harbour in the Nain district. Photo the author, July 23rd 1939.

what I would call a transitional form of the spruce forest: matted thickets of spruce or scattered copses of dwarfed spruce. In this mixture the complex character of this compound region becomes evident. Some copses of black and white spruce in patches or espalier carpets of them stretch in favourable places a good way out on the coastal tundra, in some cases even to the islands farthest away in the coastal tundra belt. It is true that on the outer coast spruce thickets offering obstacles to passage are rare, but scattered, stunted trees or clumps of stunted conifers are occasionally found in a few more or less wind-sheltered pockets all over the coastal tundra southward from Cape Mugford even out to the farthest islands, like Solomon Island, Aulatsavik Island, Lindenburg Island, Nunaksaluk Island, etc. The author made some observations of such isolated growths in connection with his other explorations in the Nain archipelago and measured their height above the sea level, and these will be given below. The most common in such outposts is the b l a c k s p r u c e.

South of Ford's Harbour the limit of some clumps of spruce 2.5 m in height lies at 52 m above sea level exposed to the north-west; Figs 121b and 177. With a westerly exposure some spruce is to be found at 63.3 m, and with a southern exposure west of Ford's Harbour even at 68 m. All the trees are marked by the north and north-west winds.

On Whale Island in a westerly exposed position some low trees were found at 48.8 m, and one low bush was growing even at 96.4 m.

On High Island in a similar position an irregular, low, bushy spruce vege-



Fig. 178. The influence of the ocean winds on the black spruce thickets at Port Manvers. Photo the author, Aug. 10th 1939.

tation grows at about 50 m, but spreading, bushy black spruce are found at some 70 m.

On Hillsbury Island there is bush forest with a southern exposure up to 55 m above sea level. At Kolotulik are matted bushes in a northerly exposure at least up to 47 m.

On Solomon Island in a south-easterly exposure is one flat bush 0.4 m high at 30.4 m.

On Sculpin Island in a westerly exposure 3 bushes were found 1 m high at 6 m above sea level. On the steep southern and eastern slopes at Slambang there are several close groups of black spruce 1—1.5 m high, with a southern exposure they reach 81.7 m. Here they are even mixed with white spruce which seems to be the hardier of the two and of which groups are found as high up as 156 m on a steep slope with a southerly exposure.

At Port Manvers the black spruce woods with a northerly exposure reach up to about 35 m, with an open exposure to 44 m, but table-shaped clumps of bushes reach up to 55 or 60 m; Fig. 178. Out on Lindenburg Island are some groups of black spruce 1—1.5 m high in a westerly exposure at 44.3 m; yet some of white spruce 1.5 m high were found at between 62.6 and 65.7 m, though this phenomenon can be observed still further south. At Windy Tickle in a western exposure the scattered patches of black spruce 1 m high grow up to 49.5 m, of white spruce to 45 m, but scattered bushes of both are to be found as high as 85.5 m. Coleman (157) mentions creeping bushes at Hebron.



Fig. 179. Aillik, seen from the south-east. In the foreground a relic of black spruce on a moss-heath rich in *Calamagrostis neglecta*. Photo the author, July 1937.

Many people consider Cape Aillik as a natural limit of vegetation, for north of it the forest nowhere reaches out to the ocean itself, although it comes near it, as on Cape Harrigan in a southerly position well protected from the sea, and at Port Manvers. At Cape Makkovik copses of black spruce in a northerly exposure stretch down horizontally to within 50 m from the open ocean; on Cape Strawberry the upper limit of forest in a north-easterly position is as high as 40 m.

On George Island the creeping black spruce patches in a southerly exposure reach only to some 35 m. On Stag Island (opposite Cape Porcupine) they grow up to 27 m above sea level.

It is a rule that the nearer to the ocean they grow the lower are the stems of the conifers till finally only espaliers of matted trees are to be found.

These observations should make it clear that the temperature is not sufficiently low to hinder the growth of trees in the lower parts of the coastal tundra. But what is the cause checking the forest growth?

It is a fact beyond doubt that the fishermen have ruthlessly extirpated the conifers in some places at lower levels; cf. Figs 179 and 177. This is partly the reason why solitary, small specimens of black spruce are found far away from the forest, whereas groups of trees are rare. Nevertheless, generally speaking, it seems evident that the limited extension of the woods is due to climatic conditions.

It was already asserted by DELABARRE that the limited distribution of tree-growth along this coast stands in direct and decisive relation to the dryness of the cold air currents and the lack of protection against drying winds, causing strong transpiration. The cold air above the Labrador Current is heated as it flows across the coastal fringe, thus causing a sudden decrease in the relative humidity, and the tree-tops, branches and shoots facing the sea and exposed to the most rapid air circulation become dried up and stunted; cf. Fig. 178, they wither and die in the winter; cf. also p. 375. Under these conditions the plants are forced to assume a xerophilous structure: the trees become stunted, shrublike. New branches are formed chiefly at the foot of the stem; the thickets thus formed protect the ground from desiccation and prevent the development of a coastal heath; cf. Fig. 163. Yet in some cases even these precautionary measures may be insufficient — the tree dries up and dies in the cold soil, rich in humus acids. On the other hand, on sunny, wind-sheltered valley slopes, especially where the declivity is great and the water free from acids, the black spruces thrive and grow in low copses like willows, alder, birch, and other evergreens. The height of these depends on the degree of protection offered by the conformation of the land, the snow-covering, etc. In some exposed places they creep close to the ground like *Salices* or *Betula nana*, in others they are totally absent. Thus xerophiles constitute the great bulk of the flora of Labrador in bays and on seashores where the soil is thin and cold and the climate windy.

On the heath, some boggy patches occur where shallow depressions reach close to the ground-water level or where water accumulates for other reasons. On such c o a s t a l t u n d r a m i r e s a thin layer of mosses and a few fanerograms are to be found, principally *Eriophorum* sp., *Juncus* sp. and *Carex* sp.

— The w a t e r-s o a k e d, a r c t i c t u n d r a t y p e with alternating swampy pools and flat stony hummocks I found only on the more or less level

soil with stagnant water, presumably poor in oxygen, on the slight, northern slope south of Ford's Harbour, Figs 174 and 175.

On the outermost headlands and islets the surface is to a great extent covered with upland turf of *Vaccinium* and *Empetrum* and overgrown with heath vegetation of an almost sub-alpine character: a carpet of *Empetrum,* in places intermingled with *Phyllodoce,* and flat patches of *Betula nana* and *Loiseleuria.* The small cavities in the rocky surface are filled with pools of water or a black mass of turf consisting of decomposed parts of *Carices, Junci* and *Eriophora.* In such boggy places a scanty vegetation of *Eriophorum Scheuchzeri, Juncus* sp., and *Carices* may be found.

Where bird manure occurs, for instance on the islands on the outermost, southern part of the coast, a luxuriant *Umbelliferae*-vegetation with *Calamagrostis* is to be found on the peat cover (469).

At the foot of the cliffs which drop down to the sea lies a cover of algae, *Fucus vesiculosus, Ascophyllum nodosum,* etc. One can observe masses of seaweed floating in the sea-currents. However, as already PRICHARD remarked, the cliffs on this coast do not stand 'weed-moccasined in the sea', for the southward current with its burden of ice has scoured them almost bone-bare. The immense flags of ribbon weed and floating kelp have been torn from northern sea-gardens by passing icebergs (761). If the shore is clayey, as in some well-sheltered places, or consists of greyish ooze, salt meadows arise with *Glyceria* sp. and *Stellaria, Juncus* sp. and *Carex* spp., *Potentilla anserina, Iris setosa, Plantago maritima, Ranunculus reptans, R. hyperboreus,* etc. with a sub-vegetation of a few mosses. The stony, gravelled shores are covered by a rather rich flora of flowering plants; among characteristic plants may be mentioned: *Mertensia, Ammodenia, Lathyrus maritimus, Plantago maritima* coll., *Aster* sp., *Senecio frigidus, Rumex salicifolius* (mexicanus), *Angelica atropurpurea, Heracleum lanatum, Haloscias scotica, Cochlearia officinalis, Stellaria humifusa, S. longipes, Galium palustre, Parnassia palustris, Tofieldia borealis, Atriplex* sp., *Salix Waghornei* Rydb., *Epilobium latifolium, Triglochin palustris, T. maritima, Juncus filiformis, J. biglumis, J. triglumis, Carex maritima, C. glareosa, Festuca* sp., etc. Somewhat higher up *Potentilla tridentata, Coelopleurum actaeifolium* (*lucidum*), *Conioselinum chinense* and *Junci* grow. On sandy soil the lowest strand vegetation is almost open and composed of *Elymus arenarius* var. *villosus* and *Senecio pseudo-arnica,* here and there with *Cochlearia.* Some metres higher up the latter is substitued by *Heracleum lanatum.* On the scattered sand patches is to be found a matted vegetation of *Empetrum, Betula pumila* and *Vaccinium uliginosum* at

the southern part of the coast. In the waters of the southern part of the region (forest region) are found *Sparganium, Potamageton heterophyllus, Batrachium* sp., *Lobelia Dortmanna, Isoëtes Braunii, Equisetum fluviatile* and in Double Mer *Zostera marina.* In sand-bottomed ponds *Callitriche* and *Subularia aquatica* were collected.

The transition between tundra and forest.

The coniferous tree-line runs fairly far out towards the stormy and cooling sea with its ordinary dry winds. Its height above sea level is about 75 m on Cape Aillik's south-east side and 40 m on Cape Strawberry's north-eastern side. At the mouth of Hamilton Inlet it runs at about 50 m above sea level but this height is naturally varied to a great extent by the orographical conditions. If the protection from north and north-east winds is given by the configuration of the land, and a southern slope for example is so great that the rays of the sun meet it at a greater angle than the surroundings, the forest limit suddenly pushes up higher, as in the clump of wood at Pottles Hill, where HUSTICH found a particularly dense spruce brushwood 2—3 m high at a place about 100 m above sea level. As a rule it seems that the forest grows highest on the south-western slopes of the mountains if they are not too steep.

On passing up the bays the land is soon improved by trees. These first appear at the bottoms of small coves, then gradually climb up the sides of the mountains until, as in the southern parts of the coast, the whole country is covered with rather dense timber growth high enough to conceal the ruggedness of the ground (434).

On moving in from the coast only a short distance the tree-line quickly rises: in Nutak it lies at about 50 m above sea level, as at Port Manvers, in Niatak at 30—40 m, but in Nain it reaches to about 100 m, and HUSTICH stated that the coniferous brush forest there reaches up to some 150—175 m (469); further up follows alder brush mixed with isolated, stunted and contorted balsam fir and black spruce. But in the interior of the Nain area the timber line, according to WHEELER (1021), is at about 1000 feet above sea level, thus deeper valleys of the mainland are wooded with spruce, while the adjacent upland surfaces are barren. Conditions at Cape Ailik are surprising; there only some miles inland from the observations quoted above the low spruce forest grows at 150 m above sea level (469) whereas the tree-limit at Cape Makkovik is at 50 m.

In the drainage area of Lake Melville the forest limit rises rather rapidly. From 35 m above sea level at George Island and 27 m at Stag Island in Hamil-

ton Inlet it rises to about 140 m at the eastern end of Lake Melville. On the southern slope in the district north of the mouth of the Susan River it lies at about 420 m; on the Lake Plateau it is at about 600 m in the south-east and about 650 m in the west. Here again it seems to be the rule that the timber line runs higher on the slopes of greater elevated masses than on isolated mountains.

All the above figures are approximative; the coniferous tree-limit in the broken land of Labrador is very difficult to determine without mapping and these figures should not be considered definite. HUSTICH has already pointed out that the timber forest in the coastal region is skirted by a vertical strip of spruce brushwood; this, however, is lower and scantier than the horizontal



Fig. 180. The thinned-out 'tundra forest' at the head-waters of George River. Photo the author, Aug. 3th 1937.

brush thickets and the belt is not so wide; yet the latter, which is very irregular, gives way in places to a more or less dense spruce bush area of low stature with its branches creeping along the ground. On the hills near the coast this bush is only to be found south of Makkovik, to the north it is replaced by scattered alder bush.

— The tree-line is hardly a limit only climatically conditioned in the real sense of the word, as has been urged by some observers. In Labrador it is evidently a resultant of many different coinciding effects. It is conceivable that the conditions of the site play an important part, especially slope declivity, exposure to winds, duration of the snow cover, and the humidity and temperature of the substratum. Moreover, historical and competitive biological circumstances must also influence the boundary. Systematic topographical investigations are necessary before the problem can be solved of the interdependence of, for instance, the coniferous tree-limit and the temperature in Labrador. —

The coniferous growth is skirted by willows and alders on the hill-sides, forming copses or low thickets which are exceedingly difficult to pass through. The hardiest of all trees seems to be the alder, *Alnus crispa;* it is always farthest up on the hills, and matted patches of alder are to be found far beyond the coniferous tree-limit. On the southerly projection of the mountain tundra between the George River and the Atlantic coast there is no other kind of tree except alder in matted bushes with a slight admixture of dwarf birch



Fig. 181. Looking north-north-west over the semi-barren, rocky land toward the north from Petitsikapau Lake on the Lake Plateau. A very thin 'tundra forest' is seen in the foreground. The ice-worn rocky summits have been to a great extent washed clean by glacigenous melt-water. Aerophoto the author, Aug. 31st 1937.

in places. PRICHARD found such alder brush on the plateaus between the Fraser River and Indian House Lake. Single alder bushes occur above the real bush forest at Makkovik, according to HUSTICH. Isolated alder bushes, some 30 cm high, are to be found in the Cape Mugford district, near Hebron, and even up to Nachvak Bay, where single birch bushes, *Betula pumila glandulifera*, are also to be seen (1). Next after the alder the rowan or mountain ash, *Sorbus aucuparia*, seems to be the hardiest. The finest copses with *Betula pumila glandulifera*, *Alnus* and *Sorbus* occur at the heads of the interior valleys and under them are frequently layers of mould with rich undergrowth.

As has already been pointed out, the transition from tundra to wood is somewhat different within the country and at the seaboard.

Inside the land, in those districts where the effects of the Labrador Current have ceased (see further on), the so-called t u n d r a w o o d shoots in between the tundra and the timber woods or profitable forests. The type of vegetation within this zone of the struggle between arctic and boreal influences has been appropriately called s u b-p o l a r t r e e-s t e p p e. It is actually formed of a heath with mosses and lichens in varying proportions and some grasses and dwarf birch and berry shrubs and sparsely spread, small, scanty clumps of unhealthy and twisted black spruce or larches [birches], or only isolated,



Fig. 182. The thin black spruce forest in the George River valley; in the centre Indian House Lake (761).

under-nourished trees, and is thus in its exterior somewhat like the so-called 'gallery-forest' with scattered trees; cf. Figs 180 and 181. However, while the latter grow where the groundwater-table rises near the land surface, the trees or tree groups of the tundra woods are confined to the drier, slighter elevations of the mostly level land, whereas all depressions and hollows are more or less boggy. Spread copses, communities consisting of upright shrubs of black spruce, 1—3.5 m high, with a sub-vegetation of a few perennials, grasses, mosses, and lichens are therefore very conspicuous in this transitional belt. As one nears the hills the trees of the transitional belt are lower and broader, and at the tree-limit there are finally only table-shaped dwarf trees of black spruce, tamarack, or alder, in many cases matted together; cf. Fig. 182. One may ask whether the tundra forest does not in many places live on frozen soil.

At the seaboard south of the Kiglapait Mts the tundra forest is totally lacking and a screen of brushwood lies between the forest and the coastal tundra.

This brushwood is made up of black spruce chiefly, white spruce and balsam spruce growing in mixed or pure groups. Larch is rare, as it is notoriously intolerant of shade. There are scarcely any foliferous species, and there is no undergrowth in the brush, except dry mosses in some glades. The trees are very closely packed; the stems are dwarfed and as the branches are often longer than the stems, they become intertwined and form almost impenetrable thickets; cf. Figs 163 and 158, see also 159. Every tree bears traces of the wind's influence; the dry and broken branches are always on the windward side, whereas the living shoots are turned away from it; Fig. 178. HUSTICH points out that on the Atlantic coast no isolated spruce of notable size are found in this brushwood belt (See NICHOL's [Transact. Connecticut Acad. of Arts and Sc., T. 22, 1918] SCHREPFER's [in HARTKE: Festschrift z. Hundertjahrfeier d. Ver. f. Geographie u. Statist. z. Frankfurt am Main, p. 367. Frankfurt a. M. 1936] and HUSTICH's [469] descriptions).



Fig. 183. Wind-torn tamarack-brush on a hill near Cartwright (468).

Some distance inside the limits of the brushwood screen copses of upright dwarfed conifers are found in very sheltered places; cf. p. 377. Parts of their short, thick, gnarled trunks creep along the ground and then rise in the shape of a bow which catches the snow and is thus saved from death in the winter. Where the copses are very dense there is no kind of sub-vegetation; sparse *Anthoxanthum* and *Deschampsia* are maybe found in some open places.

The coniferous growth beyond the tree limit is normally matted, a transitional form of the brushwood. It forms an exceedingly dense and vigorous carpet from 0.7 up to 1.2 m thick, and making one's way through it in summer time is very tiring; during my walks I often thought of Admiral BAYFIELD's (48 b) remark about a forest in Anticosti: The rocks on the coast are covered with a thick and often impenetrable forest of dwarf spruce, with gnarled branches so twisted and matted together that a man may walk for a considerable distance on their tops.

To the east of the spruce area, in places where the land is not much broken, for instance at Huntingdon Island, such coniferous brush carpets form belts sometimes a few km wide. These carpets are very like the brushwood of

birch and dwarf birch in the northernmost part of Fennoscandia, e. g. in Swedish Lapland, as described by THORE C. E. FRIES. As a rule, however, the land at the Labrador coast is broken and the brushwood screen restricted, in some places even non-existent.

This matted growth of spruce and alder, here and there intermingled with clumps of dwarf willows a foot high, is also to be found on the southern coast of Labrador along the shores of the Gulf of St. Lawrence where it appears



a.

b.

Fig. 184 a. The forested area skirted by 'tundra forest' on the southern slope of the island Iglosoatalialuk in the Okkak archipelago. Only four miles toward the east (right) is the open ocean. Here the brushwood screen is lacking. b. Spruce forest on the northern shore of the bayhead of the Tessiojak fiord in the Nain archipelago. Photo the author, July 28th 1939.

to a seated observer as a plane surface, states PACKARD. In the glades of these dwarfed forests and scattered over the moss-covered rock PACKARD noted *Cornus canadensis, Kalmia glauca, Vaccinium vitis idaea, Empetrum nigrum* (716). Yet these stunted forms are not there so widely spread as at the seaboard; HIND states that the dense, almost impenetrable barrier of stunted spruce is from some 40 to 100 feet wide, rarely more. I saw this stunted forest at Red Bay and Pinware Bay, where it creeps over the harsh, unyielding rocks and forms a treacherous covering over deep cracks. Beyond this wind screen are open woods with comparatively large timber.

At the first glance it is obvious that the distribution of the forest types must have some correlation with the exposure to the winds in the coastal belt. All along the Labrador coast the vegetation is decisively affected by exposure, as also FORBES has pointed out (275). In the interior of the Nain archipelago and on the adjacent mainland, protected against the cooling sea and the easterly winds, the forest grows tolerably well even near its polar limit. On the other hand, where the coast is open to the ocean, for instance near Kiglapait and Kaumajet and between Holton and Webouck Harbour, there is no tree growth. As both tracts are similarly exposed to the sun, the wind must be an important factor in the forest distribution.



Fig. 185. The poor, twisted forest growth, a transitional form to 'tundra forest' on the western shore of Webb's Bay in the Nain district. The highest marine limit is fairly visible as a horizontal line at 76.4 m above sea level marked out by the tree growth. Photo the author, August 10th 1939.

DELABARRE's (219) statement, based on direct observation in Labrador, is evidently conclusive: not the cold directly, but the dryness caused by it and the short duration of the growing season are the restraining causes. Therefore the wind increases the tendency to low, shrublike growth. That it must be so is not difficult to understand if one remembers KIHLMAN's research work in 1890 on the spruce at its polar limit on the Kola peninsula. The large belts of matted spruce on the edge of the forest and the brushwood are somewhat indicative. It is clear that the low temperature must greatly influence the vegetation. For every species there is a temperature minimum which it cannot survive. Moreover the physiological influence of the temperature varies concomitantly with its combination with other meteorological elements. The spruce carpets form a quite level surface and not a stem rises above it; in winter time a hard snow covering protects the brush against the cold and the wind. If a vigorous shoot rises above the carpet's surface in the summer, it is killed the following spring. The absolute humidity of the air diminishes greatly with the falling temperature, especially in winter, and this causes excessive evaporation in the frozen shoots,

increasing as the temperature falls and as the air consequently becomes drier. The shoots are thus continually losing water; but the roots of the frozen plant cannot replace the water evaporated. When the rays of the sun then begin to warm the shoot, the relative humidity reaches its minimum and it dries up, and the mechanical processes engendered by the winds, their pressure, the blasts of snow and sand, soon carry off the dead shoot. Low temperatures are more frequent on the open surface of the snow covering than in the timber forest. Also, in the forest the mechanical deterioration is not so marked as on the open brush carpets. From this one might be justified in concluding that the wind



Fig. 186. Black spruce at the shore of the first lake in the Kipekak valley. Photo C.-G. WENNER, Aug. 19th 1939.

exercises a decisive influence on the physiognomy of the forest growth on Labrador; Fig. 183.

This also explains the desiccation phenomena in the forest; cf. p. 367.

It must however be remembered, that there are exceptions to the rule. At the southern slope of the island Iglosoatalialuk (lat. 57° 16′ N, long. 61° 40′ W) for instance, only four miles from the open ocean, there is no brushwood screen; cf. Fig. 184, cf. Fig. 185.

Not far in the interior of the country, inside the coulisses of brushwood or tundra forest, is found evidence of the v i r g i n f o r e s t a r e a. The farther removed from the sea, the taller and more luxuriant grow the trees,

and in the sunny tracts with the higher summer temperature even good forests are to be found, the so-called t i m b e r f o r e s t s (56, 57, 519, 523, 588, 1018, 1021); cf. Figs 186, 187 and 188.

No definite transition can be observed between the brushwood and the timber forests (cf. KINDLE's, 519, 523, and HUSTICH's 469 descriptions). It often happens that here and there tall trees begin to rise above the brushwood; they are 6—12 m high, usually with dry or thin, often deformed tops. Then the brushwood becomes scantier, while the trees become taller. Sometimes however, the transitional belt assumes a strange character and all three forms of tree growth are represented by trees of different ages, forming a confused



Fig. 187. The dense black spruce forest at the north-western shore of the inner part of the Kipekak Bay. In the centre is the site of the Hudson's Bay Company's former Kipekak post. Photo the author, Aug. 18th 1939.

state of transition to the taller forest. The isolated trunks in such thickets are straighter than in the brushwood region, as can be observed in Sandwich Bay and in the area of Makkovik (469).

The forest.

Looking at the land from the open sea, many a newcomer has been struck by the bare and bald coast line with its rounded masses of rock without a sign of tree vegetation; only in a shelving hollow or a concave mountain flank are there patches of green moss and some willow when one comes nearer, PRICHARD remarked. However, as has already been said, the interior valleys are far from sharing the desolate and barren character of the country near the coast. The interior of the southern part of the peninsula especially is much overgrown by fairly dense, primeval forests belonging to the large, rather connected coniferous forest of the northern hemisphere, stretching fairly homogenous across America from the Atlantic to the Rockies. Even in many of the great valleys in the north of Labrador there is a quite luxuriant vegetation, but it gradually dwindles northwards to stunted spruce and alder thickets on the

plateaux along the rivers. Bell remarked already that neither the extent nor the variety of the trees of these forests is to be despised.

Some twenty species of forest-forming trees have been found. The subarctic virgin forests are generally characterized by a mixture of spruce and balsam, interspersed in places with white birch and tramble. Black spruce (*Picea mariana* [= *P. nigra*]) is the commonest tree in Labrador, probably constituting over ninety per cent of the total number, Low already



Fig. 188. Cleared land at Mud Lake. Looking south-east. Aerophoto Alexander Forbes, July 3rd 1939.

stated. Black spruce is prevalent in the poorly drained areas and especially in the north. On drier soil, especially on old burnt-out patches in the interior, it is partly replaced by white spruce (*Picea glauca*). The balsam spruce or balsam fir (*Abies balsamea*) predominates near the coast where the soil is somewhat deeper; it is widely distributed both in mixed and pure groups, especially in the south. The tamarack or larch (*Larix laricina*) is perhaps the hardiest of the trees and probably next in abundance to the black spruce in the north, where it replaces the other principal species on open, cold, sodden ground; the larch seems to be a pioneer, it dislikes shade

and therefore grows in small patches only on open hills or swampy bogs and other open land, e.g. burnt-over areas. In the timber forests the larch seems to have been crowded out by the spruce and the balsam, and occurs only on its edges. When the tamarack takes on its autumnal dress of yellow, it gives an exceedingly beautiful effect to the landscape interspersed by the dark green of the spruce (995).

Deciduous trees are rather scarce from a physiognomic point of view.



Fig. 189. Thin black spruce forest with undergrowth almost wholly of *Cladonia alpestris* on the slight northward slope of the southern shore of Goose Bay opposite John Grove's house and 5—25 m above sea level. N.B. There is no snow. Aerophoto the author, July 3rd 1939.

On burnt-out areas and in the young forests of the interior b i r c h (*Betula papyrifera*) forms graceful clusters on sandy banks, also a s p e n (*Populus tremuloides*) and sometimes b a l s a m p o p l a r (*Populus balsamifera*) on the shores of the lakes and on the banks of rivulets, together with some b i r d c h e r r y (*Prunus virginiana*) and r o w a n or m o u n t a i n a s h (*Sorbus aucuparia*). At the shores of lakes and rivers there are a l d e r (*Alnus crispa*) and willow hedges from 7 to 8 m high almost impenetrable without an axe; in some places the connected, winding little brooks actually disappear under arched thickets of alder and willow; Fig. 194 a.

The forests vary greatly in density, as does the quality of their tree growth, from place to place; their distribution and their range of variety depends evidently on several factors: latitude, height above sea level, distance from the ocean, soil and shelter from drying winds.

Forest types and their extension.

Practically all the primeval forests in Labrador may be considered spruce forests. Larch forests occur only near the tree-limit or on boggy ground and are restricted in area; in addition they represent, like the birch forests, a



Fig. 190. Black spruce forest rich in reindeer lichen in the Susan River valley. In the background forest destroyed by fire. Aerophoto the author, Aug. 1937.

transitional type only, as they will probably in some decades be ousted by the spruce.

In the Labradorean forests the ground is covered by a soft, surprisingly thick layer of mosses or lichens, and the composition of this cover is indicative of different types of forest. Two extreme types can be distinguished: the l i c h e n f o r e s t, where the cover is pure reindeer-moss (*Cladonia alpestris*), cf. Figs 189—191, and the gloomy, pure m o s s f o r e s t, where the cover consists of a very thick bed of mosses (*Ptilium crista-castrensis* and in some places tufts of *Sphagna acutifolia* coll.; in drier forests *Hylocomium parietinum*); cf. Figs 192 and 193. This mossy cover is so continuous and can become so thick that the chaotic maze of stones and boulders beneath quite escapes

attention even in the small glades, and in some damper places one sinks some two feet into it. The spruce has mostly the same shape as that in Lapland.

In these pure types of spruce forest there is, as a rule, no undergrowth except some isolated brush of *Betula nana* or *Ledum groenlandicum*, the so-called Labrador tea, whose presence is betrayed even far away by a faint but not unpleasant fragrance. These extreme types of spruce forest are fairly widely scattered. Between them, however, are to be found a series of transitional types. The transition begins when *Peltigera aphtosa* and *Cladonia rangiferina* take root in the mossy forest, *Hylocomium* in the lichen forest.



Fig. 191. Black spruce forest at Sandgirt Lake; in the lower right corner the forest is very rich in reindeer lichen. In the background to the left are seen some tents of the prospectors' camp. Looking north-west. Aerophoto the author, Aug. 2th 1937.

Where the trees in the mossy forest are somewhat spread out undergrowth also appears. In the undergrowth of the forests in the south we find *Betula nana* and all over an enormous quantity of *Ledum groenlandicum*, also scattered bushes of *Amelanchier canadensis*, *Viburnum pauciflorum*, *Lonicera coerulea* and *Ribes prostratum* and willows, whereas in the interior and the north there are only *Betula nana* and *Ledum groenlandicum*. In shady places on damper ground the sombreness is brightened by flowering plants: *Comandra livida*, *Cornus suecica*, *Linnaea borealis*, *Clintonia borealis*, *Coptis trifolia* (*groenlandica*), the charming *Chiogenes hispidula*, whose creeping ground tendrils trace graceful patterns on the moss cover, *Ranunculus lapponicus*, *Pyrola rotundifolia*, *P. minor*, *Streptopus amplexifolius*, *Moehringia lateriflora*, *Onoclea sensibilis*, *Osmunda claytoniana*, *Equisetum silvaticum*, *Selaginella*, *Lycopodium*. In the brook-valleys under the thickets of *Salices* and *Alnus viridis*, *Carices*, *Eriophora*, *Graminaceae* and many flowering plants grow: *Thalictrum* sp., *Epilobium Hornemanni*, *E. anagallidifolium*, *E. angustifolium*, *Alchemilla glomerulans*, *A. minor filicaulis*,

Primula farinosa, Parnassia palustris, Polygonum viviparum, Nasturtium palustre (*Roripa palustris*), etc., and in more open, drier glades principally *Hylocomium* with *Vaccinium angustifolium* (*pennsylvanicum*), *Majanthemum canadense, Trientalis americana* (*borealis*), *Cornus canadensis, Pyrola chlorantha, P. secunda, Rubus arcticus,* L. var. *acaulis* (Michx), *Solidago multiradiata* Ait., *Lycopodium annotinum, L. obscurum, L. selago, L. clavatum, L. alpinum, Selaginella, Botrychium lunaria, Equisetum silvaticum, E. arvense.* This forest is still too dark to allow the *Cladonia* species to thrive; besides, the spruce forest retains too much of the moisture.

In the sparse forests in the north, near the horizontal forest limit, for instance in Nutak, there is a fairly strong undergrowth of *Betula nana* and *Salices* and scattered flowering plants varying with the amount of light and the degree of ground moisture. In fairly moist places are found: *Taraxacum croceum* coll., *Castilleja acuminata, Silene inflata* (*cucubalus*), *Habenaria obtusata, Potentilla Crantzii* (*alpestris*), *Salix Barclayi* and *S. argyrocarpa, Phegopteris dryopteris, Ph. austriacum, Cystopteris fragilis, Athyrium angustum, Woodsia ilvensis,* and on dry elevations *Solidago virgaaurea, Campanula rotundifolia, Potentilla tridentata, Draba incana,* etc. At Port Manvers in the declining, stunted forest of black spruce there are *Artemisia canadensis* and *A. borealis* — The enumeration of species given in this chapter is not founded on any systematic studies, but on notes made on the way. The names of the species have been checked by Kustos of the Botanical Institute of the University of Helsingfors, Dr. Harald Lindberg, the eminent florist. On the other hand, where the lichen forest becomes somewhat denser *Empetrum,* bilberry, *Deschampsia,* dwarf birch and *Ledum groenlandicum* take root; seldom willow bushes.



Fig. 192 Dense mossy black spruce forest four miles to the north-east from Dove Brook, Sandwich Bay. The levelling stick is 4 m long (468).

Many complex types have come into existence through gradual change.

My first contact with the primeval spruce forest in the south of Labrador was a crushing disappointment. According to the maps the forest limit in the

south-east lay tens of km from the Atlantic coast and my schedule of work had been drawn up accordingly. However, on arrival I found the forest reaching down to the fiords almost everywhere, and tongues of brushwood or patches of low forest extending at more or less regular intervals right to the ocean, as in the regions around Cape Porcupine and St. Michael's Bay and Cape Strawberry and Cape Aillik, etc. (see p. 365 sq.); cf. the map. In Backway on Lake Melville, where the author first penetrated the wood, it was so dense, especially the black spruce and balsam spruce forest, that it was difficult to swing an axe and practically impossible to penetrate the bushy undergrowth on foot; it is exceedingly tiring to travel in such a dense forest, where in many places one sinks down to



Fig. 193. Mossy black spruce forest on the northern shore of the tide-lake immediately above Kipekak Bay. Photo the author, Aug. 18th 1939.

the knees in the mossy covering of the soil, moist as a sponge. In the coastal regions branches grow on the distorted tree trunks down to the root, and are often thickly matted with the bushy undergrowth. This in many places so effectually covers the bed of windfalls, lying literally in layers, that it is impossible to gauge how deep one may fall if one slips in creeping over the slippery, moss-covered piles of fallen trees. In addition, as the creeping branches of fallen black spruce take root and new twigs and top shoots appear, forming so to say a bushy mane, visibility is often only a few metres, and in cloudy weather one may lose one's sense of direction and go astray. Advancing by the brook valleys in such a forest is even worse, as there are thin, poor black spruce stems in great masses forming shapeless 'stiles' and 'Spanish riders' which interwoven with flexible alder and willow form a sort of elastic network. One is sooner or later forced to retreat with torn skin and tattered clothes from these hot primeval brushwood thickets with their nauseating smell of balsam resin, teeming with

flying vermin, especially gnats, b l a c k f l i e s, which insinuate themselves not only into the ears, eyes and nose but also into the trousers and under the shirt.

This chaotic spruce forest interspersed with small swamps and bogs is that which in Siberia is called t a i g a: the grim, ruthless wilderness, in summer



a.

b.

Fig. 194. Vegetation round the small lake into which Susan River and Beaver River fall. a. Looking along the northern shore. b. Looking toward the south-west over the southern shore. Photo the author, July 6th 1939.

dreaded by man and destined by nature to be the breeding ground for the most precious fur-bearing animals and in winter an excellent trapping-ground.

The thick, fairly tall forest in sheltered places in the fiords reaches right down to the shore, and there its density is increased by much balsam; cf. Figs 194 b, 187, 186, 195, 184 a and b, 185. In Sandwich Bay it is separated

from the sea by a *Myrica* hedge, and between this and the sea there is a 3—25 m broad belt of salt meadow with *Carices, Iris setosa* and *Potentilla anserina, P. palustris* as characteristic plants, on silty places *Ranunculus reptans, R. pygmaeus, R. cymbalaria, Pleurogyne rotata, Epilobium palustre* and *Primula mistassinica*, and on drier spots *Armeria vulgaris* coll., *Montia lamprosperma, Puccinellia phryganodes, Epilobium latifolium*, etc. thrive. In front of the black spruce forest at Grande Lake a 4—7 m high and 20—100 m broad belt of luxuriant, intertwined, tall willow and alder stretches into the sea with an undergrowth consisting of *Carices* and *Potentilla palustris, Sanguisorba* and *Equisetum*, which is very difficult to penetrate; see Figs 194 a and 196. In drier places the willow is replaced by balsam poplar.

Somewhat higher up in the interior the forest is less dense and the trees more regular in shape. The horizontal forest limit can be drawn about 10 km east from Rigolet. At the Narrows of Rigolet the spruce is already 13—14 m high, but the timber comparatively scanty; HUSTICH estimated one tree per 10 square metres. At Moliak on Lake Melville the spruce grow up to 12—13 m in height and 0.2—0.3 in diameter and at their maximum around this lake are 23 to 32 m high (519, 523). Black spruce is the dominant species throughout the Lake Melville district, other trees are balsam fir, tamarack, canoe birch (*B. papyrifera*), white spruce, balsam poplar, yellow or grey birch (*B. lutea*) and aspen (*Populus tremuloides*, Michx). Towards the interior white spruce becomes increasingly more common, e.g. at North West River: the forest there is noticeably of a more inland type than on Lake Melville's northeastern end. In the Lake Melville area most of the black spruce forest is rather connected (cf. Figs 169 and 188), but they give a sinister and tortured impression; cf. Fig. 167. The trees are 14—20 m high at the estuaries of the Susan and Beaver Rivers (Fig. 194 b), and the forest there is in many places bad to penetrate; few dried up specimens occur. On the other hand the trunks are rarely straight even when growing close, but twisted and bent, except for ome specimens of balsam fir; here also beside the little rivers alder and some



Fig. 195. Part of the park in Nain, in the background the schoolhouse. Copyright WILMONT T. De Bell, 1937.

willow form sparse, tangled hedges, bent by the snow. In open spaces here some white spruce is found as well as birch and much *Ledum groenlandicum* and small *Salix* bushes; it is evident that these spots have been swept by forest fires.

Further inland towards the Lake Plateau the trees are generally still more sparse on an elevated terrain, but places can also be found between them with beds of mosses into which one sinks halfway to the knees, so that to walk there quickly saps the strength of the muscles, the more so because of the



Fig. 196. The forest around the small lake into which Susan River (in the background) and Beaver River fall. To the left is Alexander Forbes, to the right Carl-Gösta Wenner is preparing his famous omelette. Photo the author, July 6th 1939.

dwarf birch thickets often reaching to the shoulders. Patches of whitish or pink *Sphagna* in open spaces give a clear indication of the fate advancing upon that type of forest.

As the trees are more spaced the trunks grow straighter and the branches at the roots disappear. In such a mossy spruce forest black spruce may even be found grown up into mast-trees of dimensions such as are rarely found even in Fennoscandia's forests. In Kenamish at Lake Melville there are balsam spruce 30.5 m high, measuring 0.64 m in diameter at the root. The high, straight trunks are chiefly found in the valleys of the great rivers, especially in the Hamilton River valley, and on the better forested valley sides. In the heavily lichened forests, on the other hand, the trees never seem to grow very high.

The highland between the Susan and Hamilton Rivers is a predominantly rocky landscape with more meagre but more varied forest types. Most frequent are tattered dwarf forests with larch and black spruce, like to the south of Beaver River and thence towards Grand Falls. Yet in the valleys the forest is comparatively good in scattered patches and fringes to the water courses; see e.g. Figs 76 and 194.

Big Hill to the east of Grand Falls is considered by the trappers a landscape divide. The good timber forest in the Hamilton River valley here gives way to stunted spruce and firs, with a thick mantle of moss softening the outlines of the rocky hills around. Looking from above at the landscape streaming by it is easy to understand the difficulty of finding one's bearings in this scantily forest-clad district with low cliffs and small patches of bog here and there but without any distinctive landmarks. At a lower level, on the other hand, the forest consists of black and white spruce, some balsam spruce and birch, and is quite dense at the bottom of the valleys.

Where the coastal regions merge into the Lake Plateau the landscape is more hilly and animated and the drainage is more definitely localized so that between the rivers the land is dry. The forest here is almost sparse, especially in elevated areas. On the other hand the air circulation is increased and the bush of *Ledum* and *Betula nana* and mosses is gradually replaced by a more or less continuous carpet of whitish-yellow *Cladina*, predominant on the elevations and forming true lichen forests on the drier parts. The 'caribou moss' forests arouse admiration in the traveller for their beauty and wonderful adaptation to the climate. This pale, cream-coloured caribou moss near the 'Height of Land' was found by HIND to be sixteen inches high, forming a coherent, lovely carpet, soft as a bed of down when moist. In this thick covering, when dry, you will discover the caribou paths and the bear tracks, which you know by their curiously human footprints (761). The lichen grows extremely slowly and a man's imprints can be seen years after he has passed there in summer.

Little is known of the moss-rich forest of the interior. This much seems to be clear, however, that the cold-tempered vegetation types by far outnumber the arctic and that the land is partly covered by fairly well-grown trees; cf. Figs 75 and 191. Scattered information regarding the forest is found with LOW, BRYANT, Mrs. HUBBARD, CABOT, WALLACE and especially KINDLE. My knowledge of it is only superficial and restricted to the Lake Plateau and the George River's highest course, being gleaned during some trips by airplane.

On the Lake Plateau itself the forest growth seems to be fairly continuous,

except for the boggy and swampy places, but it has many barren patches, so that wooded area forms but a small percentage of the total drainage basin; cf. Figs 108, 181. Here forest fires have worked very extensive havoc, as can be seen from the second growth with a rich admixture of deciduous trees, and there the same gay, smiling scenery can often be found as in the lake districts of Finland. With the summer sunshine pouring down and the spruce trees spreading their delicious fragrance and the bathing in lakes with water at + 26° C, one easily forgets that the fate of this country is to be a snowland for eight months of the year, with a temperature below — 30° for long periods and even falling to — 50° C or more. The timber has, however, been much spoiled by drought, so that often only skeletons of the useful trees remain, giving the landscape a ghostlike appearance. In some places the pendant *Usnea* hangs mournfully in beard-like masses from the dying spruces, and the stunted forest is clothed for miles in this hoary livery. Here too the undergrowth on level ground consists principally of thick beds of moss with an abundance of rather tall *Betula nana* and *Ledum groenlandicum.* The former grows here with willows and alder in dense fringes along the shores of the brooks and lakes and forms thickets occupying much of some glades especially in the semi-barrens. The bush-undergrowth of the primeval forest may be very dense here and crossing it in the summer is so difficult that it might mean death to make a forced landing with an aeroplane without having a canoe and food. Throughout the open inland forests the lowland streams and lakes are also here fringed with the famous thickets of alder and willow almost 5—7 m high. Such belts also surround all the headlands and islands, Fig. 194 a, and separate the spruce forest from the lake shore, and with their subvegetation of grasses and flowering plants: *Solidago, Sanguisorba canadensis, Aster* (*acuminatus*?), *Linaria* sp., *Rubus arcticus,* etc., are very difficult to penetrate. The farther north they are found, the taller the alders and willows grow; at Fort Chimo they can attain a size seen neither at Davis Inlet nor Rigolet, Turner reports. — Here it should be pointed out that the *Rubus arcticus* of the Americans is not identical with the species with the same name in Fennoscandia; the leaf is different and the exquisite aroma of the European berries is lacking.

Finally we shall give a short outline from some notes concerning the coastal woods.

The forest vegetation in the valleys debouching into the north-east of the Gulf coast has been treated by Bryant (107): The elevations are to a large extent treeless, whereas the valleys are filled with dense forests in which numerous small lakes and rivers can be glimpsed. He also reports that the first

twenty-five miles up the St. Augustine River valley are covered by woods of the black spruce and balsam spruce characteristic of the Laurentides. For the next twenty-five miles up the river the forest becomes scantier and lower and groves of birch insinuate themselves on to open spaces. In the following twenty miles the percentage of black spruce increases; here trees 2 feet in diameter can still be found. The undergrowth in these wooded areas consists chiefly of *Ledum groenlandicum*, *Betula nana* and laurel (*Kalmia glauca*), on the moors there are *Andromeda polifolia* and *Cassandra*, growing from 2—4 feet high in tangled masses, and very difficult to cross. In the semi-barren this undergrowth dies out, and travelling is much easier. The regions of the water-divides about 1200 feet above sea level and about 141 miles from the coast consist of flat and fairly open land; in the valleys are thickets of alder and sallow, on the level areas some black spruce, but on the burnt hill-sides there are clumps of poplar. Extremely widespread forest fires have here contributed to the regeneration of the forest. The mires are very extensive and even creep up the sides of the mountains. In favourable years in the late summer they are bright with yellow bakeapples (*Rubus chamaemorus*), the checootai of the Indians, the akbik of the Eskimoes, which have been used since time immemorial by both aborigines here as a prophylactic for scurvy.

On the Atlantic coast the forest slowly changes towards the north, the trees become more spaced, they are shorter and their trunks thinner, growing branches at the root.

Upstream along the Mary's River is a spruce forest 10—12 m high. Hustich found the country around its lower parts amazingly reminiscent of an inland landscape in the spruce forest region of northern Finland; also here were small woodland pools with *Nymphaea*, *Calla* and *Lobelia*, species not yet found farther north on the coast (469); Fig. 203.

At the mouth of Alexis Bay only brushwood in sheltered dells can be observed, but some 16 km inland the well-developed, 12—15 m high forest reaches right down to the shore; cf. Fig. 71. Here lumbering is carried on.

The forest area is not extensive in the rocky landscape in the south-east. At Cape Michael I estimated from the airplane that 25 per cent of the area was covered with black spruce forests of the poorest kind, while the area with trees towards the south did not exceed 5 per cent. At Cape Bluff the rocky area is practically devoid of woods. At Black Bear Bay alternating woods and marshes begin at 5—10 miles from the shore. Nearer the coast the climate seems too dry for forest vegetation.

On the outermost headlands south-east of Sandwich Bay only solitary spruce, juniper and mountain ash grow in sheltered dells. But around the bay

itself the islands and slopes are covered by a continuous black and balsam spruce forest with a sprinkling of larch patches. The trees are here almost 10—15 m high. The forest is separated from the seashore by an extremely dense brushwood belt, some 10 m high, with black and balsam spruce. Burnt areas with a second growth of aspen and birch (*B. papyrifera* and *lutea* ?) are fairly frequent round the interior part of this bay. In the greater forests here Hustich noted that as a rule the age classes are not represented by different layers.



Fig. 197. Looking south from the highest marine limit at 78.6 m above sea level on the southern slope of the Challenger Knoll in the Nain district. The levelling stick is 4 m long. Photo the author, July 27th 1939.

In some places, however, a brush layer about 1—2 m high, a 3—5 m high upper brushwood layer and a sparser, the so-called timber forest layer may be distinguished. This forest is thus of quite another type than that of northern Fennoscandia. Moreover, in the uppermost layer many of the trees may have a dry top, especially where the diameter exceeds 15 cm. Where balsam predominates the brushwood layer is particularly dense. In these copses isolated tree stems are warped and stunted, the branches are often longer than the stems. Near the rivers such a forest can be practically impenetrable. —

In the dwarfed spruce thickets and low forest round the head of Hamilton Inlet the trees are 15—35 feet high and have distorted stems, but round

Lake Melville, as already reported (p. 369 sq.), the trees are much larger. Cf. Fig. 204.

The forest vegetation of the Makkovik area was investigated by HUSTICH (469). The cleared forest here reaches a height of 10—12 m; inland a black spruce was found 13 m high and 0.6 m in diameter, while the brushwood belt extends to about 100 m above sea level. The trees grow but slowly on account of the short summer, the trunks are twisted like corkscrews and the forest is thus useless as timber.



Fig. 198. Forest of black spruce and larch on the northern slope toward the Ojagaloartak in the Nain district. Photo C.-G. WENNER, July 1939.

In contrast, fairly good spruce forests grow along the Kipekak Bay and all around the lakes; cf. Figs 186 and 187.

Finally the forest gives place to a parklike vegetation, as on the islands in the Okkak archipelago; Fig. 184 a. In the northernmost parts of the wooded area the tree growth becomes increasingly lower, cf. Fig. 197, the trees and tree groups are few and far between both with good exposure close to the sea-level, Figs 185 and 195, and on the southern valley slopes, cf. Fig. 198. The park at the mission station of Nain, cf. Figs 199 and 236, shows that the conditions of tree growth are rather satisfactory in wind-sheltered places, when kept safe from devastation by the schooner people.



Fig. 199. Looking west over the Eskimo village and the Mission station of Nain. The famous park stretches from the village to the valley. Aerophoto the Forbes-Grenfell Expedition, 1931.

The park at Nain is composed of white and black spruce, balsam and larch, their knotty stems growing up to 45 feet high. Further out trees seldom reach a diameter of three feet, and fifty feet would probably be a generous estimate of their height. Deciduous trees are relatively rare (1021).

The height of the rocky substructure varies extremely in the Nain area, as does the exposure to the points of the compass and to the wind. For this reason the quality of the forest, its height, and its upper limit also vary con-



Fig. 200. The black spruce forest strip on the western shore of Nutak Bay just above the trading post. Photo the author, July 25th 1937.

siderably. In the Tikkoatokak Bay, for instance, the steep southern shore is almost completely barren, whereas the northern is wooded up to nearly two hundred metres above sea level if not too steep; Figs 184 b and 198. The mountain ridge just north of Nain, Fig. 199, illustrates these variations: on the southern slope trees grow at some 175 metres above sea-level, whereas the northern slope is either barren or covered with heath down to the shore; all this is the more surprising in approaching from the Strathcona Run. In the well-protected Nutak Bay a sparse black spruce forest grows 8 m in height; it starts from 10—12 m above sea-level and extends to about 50 m above it; cf. Fig. 200; the cooling sea water probably prevents it reaching down to the

seashore. My observations made it clear that the dryness of the air is one of the reasons why the upper forest limit is here so low.

As far as the forest growth in the Naskaupee River and the George River valleys and their surroundings is concerned, my knowledge is limited to hearsay. In the lower Naskaupee R. valley Dillon Wallace (995) reports some good timber, but for the most part the trees are scrubby and knotted. In the country near Seal Lake everywhere so far as sight extends, the valley is comparatively well wooded, but the treeless, rock-bound hills rise grimly above the timber line. Around the Mishikamats Lake the timber growth is sparse and scrubby, consisting of spruce and tamarack. Northward from Mishikamats the country is low and swampy, and tamarack is the chief timber; some trees are straight and fine, fully twelve inches in diameter at the butt and fifty feet in height. The hills down Atuknipi Lake are barren almost to their base and increase in altitude with every mile northward. The river valley is almost destitute of trees. On the northern lakes a scant growth of timber was apparently the original growth though none of the trees was more than eight inches or so in diameter. The timber line ends at 275 ft above Desolation Lake. Farther north spruce lines the river banks on either side. But save for here and there a small grove of spruce trees in some secluded nook at long intervals the country is destitute of growth and barren south of Barren Ground Lake. — Cf. Fig. 156.

Mrs. Hubbard has left reports on the tree growth in the river valleys on the route from Grand Lake to Ungava Bay.

At Mishikamau Lake the wood growth is small, scattered spruce and larch.

From Mishikamau towards the east there is a perceptible difference in the size of the trees; in the sheltered river valleys they are bigger than in the plain above. The country around the northern part of Seal Lake was burned over long ago, and has grown again with poplar and white birch through which the rocky hilltops rise bare and stern. To the south of Seal Lake the country is more rugged and barren, great rocky hills standing out towards Lake Mishikamau; the forests are partly burnt, and often dwarfed.

Around the 'Height of Land' between the basins of Lake Melville and the George River the country is flat and boggy, the tree growth consists mainly of scattered tamarack interspersed with dwarfed spruce brushes, many of the slender tops of the former being completely bent over, telling of the rigorous climate; Fig. 180. Where the country is burned over it is exceedingly desolate, the hills being barren even of reindeer moss.

In the region of Indian House Lake in the George River valley Prichard

mentions some fairly large timber in the sheltered valley, including black and white spruce, juniper (larch) and birch. However, for the most part the forests here are poor — cf. Fig. 182; evidently the Indians have rifled them for their extensive hunting fences. Near the mouth of the brook draining Mistinibi Lake Wheeler noted a marked contrast between the heavy woods east of Indian House Lake and the sparse growth west of it (1021).

Quite surprisingly there is again a fairly good forest in the lower parts of the George River valley. Mrs. Hubbard says that it consists of spruce and larch, with at intervals a little balsam, and is, for some distance below Barren Ground Water, rather more luxuriant than along the shores of the lake. At best it is but a narrow belt covering the hillsides to a height of perhaps two hundred feet, and dwindling gradually away towards the north. Rather surprising is the occurrence of some forest in the Koroksuahk valley, Fig. 160; cf. p. 333 (1022).

South of the northern limit of trees near Ungava Bay the forest slowly attains greater size and extension, Turner stated. The timber north of the 'Height of Land' is comparatively small, the spruce and larch rarely being more than 12 to 15 in. at the ground and rapidly tapering up for 2 feet or so. In a few instances spruce produces symmetrical stems for more than 15 feet. The trees within 40 miles of Fort Chimo seldom exceed 10 in. in diameter; the larger trunks are selected to form the walls of the buildings at that trading-post.

The forest is more or less continuous over the southern part of the peninsula to between latitudes 52° and 54° following Low, the only exceptions being the summits of rocky hills and the outer islands of the Atlantic coast. North of latitude 55° more than half the country is treeless, woods being only found about the shores of small lakes and in the river valleys. The trees also decrease in size until they disappear altogether on the southern shore of Ungava Bay.

The productive wooded area is considerably smaller than that indicated on the map.

It may be stated generally that the primeval forest of eastern Labrador is mostly of a poor quality. Nor should the great forest area shown on the map be allowed to create a misleading impression of its quantity. In actual fact the forest is cut up not only by lakes and watercourses (see the Lake Plateau, Fig. 18) but also by heaths on the summits of mountains. Such scattered heaths and rocky spots unfit for tree growth occur most frequently near the coast towards which the upper limit of the forest drops, and especially in the

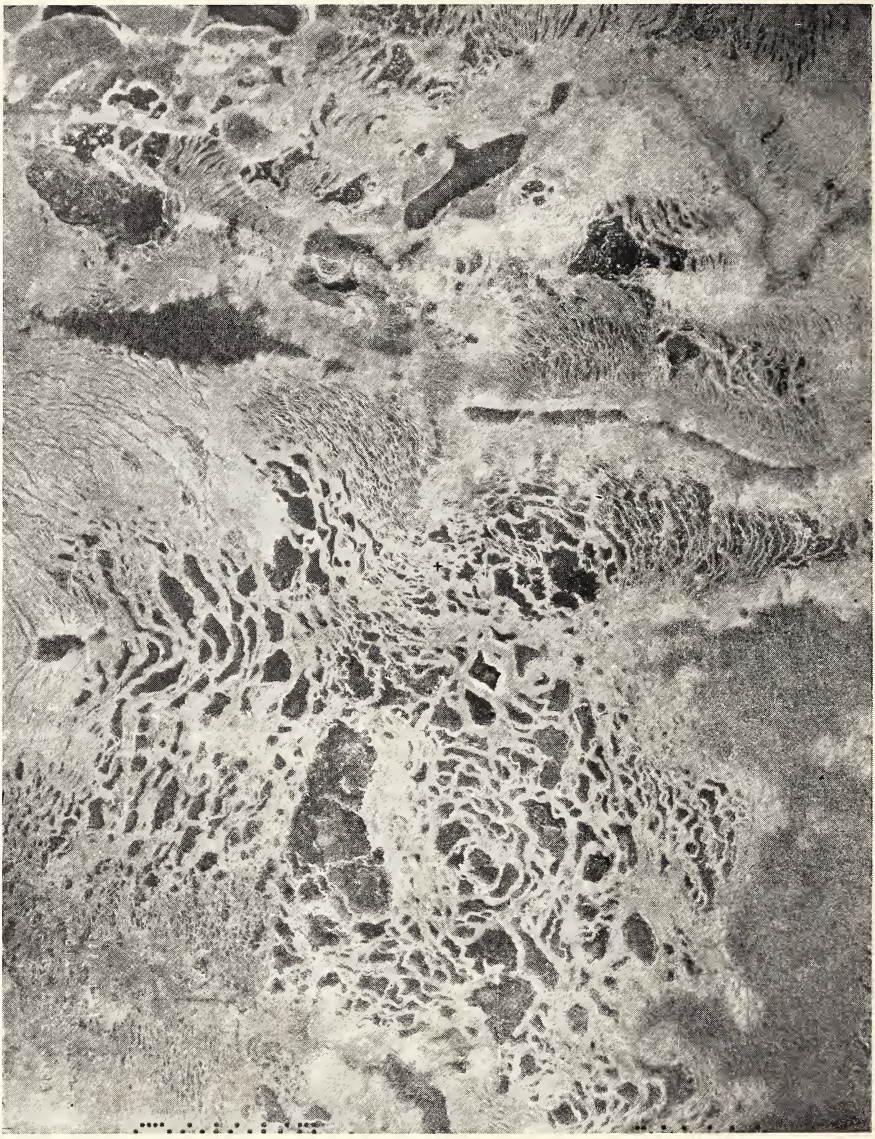


Fig. 201. Mire land vegetation in the forest area toward the west from North West River. The horizontal edge of the picture is about 1 km in width; the longer edge runs about north-south. The characteristic Lapland type prevails (cf. p. 413). The little bog area 40 mm toward the south-south-east from the cross in the centre resembles a configuration to be found somewhat south of the arctic circle and in Österbotten in Finland. Aerophoto Canadian Airways.

north, because the hills become higher and more frequent in that direction. Great expanses within the region indicated on Fig. 156 as being forest are thus barren or half-barren land, where forests of economic value will never thrive. Such areas unfit for wood cut down considerably its utilisable percentage.

For instance the large, barren and relatively dry country between the upper part of the Hamilton and the Beaver Rivers is most desolate. Denuded of trees, the surface, where not burnt, is covered by patches of caribou moss with 'Labrador tea' and bilberry bushes between the maze of boulders, and small peat-bogs with thickets of alders and willows in the damp clefts and hollows. Language seems inadequate to describe the hopeless desolation of this upland landscape, BRYANT exclaims (105), no living thing was encountered, and the silence of primordial time reigned supreme. On the slope towards the Lake Plateau this country is covered with stunted spruce trees, among which great rocks gleam. On all sides are white patches of caribou moss, bogs and hundreds of shallow lakelets reflect the clouds above, presenting a labyrinth of channels and island passages. The general impression of the landscape was one of bleak monotony and uselessness.

There are other more important groups of bare mountain summits or ridges within the forested area near the east-west water divide. Considerable complexes are formed by the Mealy Mts group between Lake Melville and Sandwich Bay, the regions south-west of Sandgirt Lake — Birch Lake, the region north and west of Birch Lake — Petitsikapau Lake, north-east of Mishikamau Lake and north of Seal Lake towards Hopedale and Makkovik, etc.

Bogs and fens.

The remaining forested area is further reduced by mires (bogs and fens) [1]; Fig. 201. Unfortunately these reach their greatest extension just in the

[1] Professor G. EINAR DU RIETZ in Upsala has reminded the author of the varying nomenclature and classification of peat land vegetation, and has assisted the author in an attempt to bring the nomenclature of these vegetation types into accordance with modern ecological literature. Thus the English word »m i r e» is used as a general term for peat land vegetation, i. e. as a substitute for the German »Moor» and the Swedish »myr» (GODWIN in Chronica Botanica, Vol. 6, No. 11, 1941, p. 260). The »ombrogenous» type of mire vegetation nourished o n l y by atmospheric water and very poor in species is called »b o g» (= C. A. WEBER's »Hochmoor», Swedish »mosse» sensu DU RIETZ, OSVALD, THUNMARK and others). The types of mire vegetation influenced by ground water and more or less richer in species than the bogs are called »f e n» (= C. A. WEBER's »Flachmoor», Swedish »kärr» *sensu* DU RIETZ, OSVALD, THUNMARK and others); comp. GODWIN, l. c. and A. G. TANSLEY, The British Isles and their

interior within the boundaries of the forest of finest growth; there mires have formed in depressions right up to the hill and mountain summits. On the other hand the occurrence of mire communities decreases towards the coast, as here the climate is drier and therefore not propitious for them. Also the drainage nearer the coast is better owing to the morphological diversity of the surface and its decidedly greater slope towards the coast. Out on the seaboard the mires are inconsiderable or non-existent.

At the south-western part of the Lake Plateau the *Carex*-fens are extensive and numerous as I could note from the aeroplane. But also in the south-eastern part of the peninsula there are fens and bogs with a varied flora: *Carex vesicaria, C. canescens, C. tenella* (*disperma*), *C. pauciflora, C. irrigua, C. capillaris,* etc., *Eriophorum angustifolium, E. vaginatum, E. alpinum, E. Scheuchzeri, E. chamissonis, Scirpus caespitosus, Ledum groenlandicum, L. palustre, Chamaedaphne calyculata, Andromeda polifolia, Kalmia polifolia, K. angustifolia, Empetrum, Vaccinium uliginosum, Oxycoccus microcarpus, Rubus chamaemorus, Sarracenia purpurea, Drosera rotundifolia, D. longifolia, Smilacina trifolia, Menyanthes trifoliata, Pinguicula vulgaris, P. villosa, Pedicularis palustris,* etc.

In the holes in the mires in the south are also found *Calla palustris, Utricularia* and in the lakelets *Nymphaea.* In part and especially near the borders they are clad with sparse coniferous growth consisting of 1—3 m high black spruces and some larches, *Betula nana* and *Ledum groenlandicum* bushes 65—75 cm high, very difficult to wade through and especially unpleasant when it is raining. From these bogs extend swampy bands with dense thickets of willow, alder, *Ledum groenlandicum* and *Carices* along the depressions into the forest. A very moist fen rich in *Sphagnum,* with knotty black spruce and an abundance of *Sarracenia purpurea, Drosera* and *Pinguicula* species and some *Eriophora* — Fig. 185 — forms the transition between bog and forest. In some

Vegetation (Cambridge 1939). The mineral soil water limit (Mineralbodenwassergrenze *sensu* THUNMARK in Verhandlungen d. Internationalen Vereinigung für theoretische und angewandte Limnologie, Band IX, 1940, p. 66) coincides with the vegetation limit between bog and fen. Taken in this sense, »f e n» (Flachmoor, kärr) includes not only the r i c h f e n (Swedish »rikkärr») of DU RIETZ (= WEBER's »Niedermoor» and GODWINS »eutrophic fen») but also the p o o r f e n (Swedish »fattigkärr») of DU RIETZ (= WEBER's »Übergangsmoor» and GODWINS »oligotrophic fen»). Owing to the dominant role played by *Sphagnum* (though mostly other species than in the bogs) in the »poor fen», this type has been included in the bog (Hochmoor, mosse) concept by many authors in Sweden and other countries, which has led to much confusion and which must always be remembered when comparing different works on mire vegetation.

districts, e.g. all round Goose Bay where the soil is silty, the moss-rich *Sphagnum*-fen seems to be spreading over the surrounding forest. In the middle of the extensive mires in the central parts of the district are more or less large areas rich in bogs; they creep very slowly in one more definite direction; see Fig. 201. These mires have been partly decomposed by mechanical agents, principally by the frost, and are a mosaic of bog and fen (flark or rimpi mire) where irregularly curved lines of somewhat drier bog vegetation run in festoons across the narrow fen belts with pools of water or turf mud. The bogstrings are rich in *Betula nana*, on the borders of the turf mud spots *Eriophorum angustifolium* and *Carex irrigua* grow. This same kind of mire in a state of decomposition but considerably smaller also occurs here and there near the Narrows of Rigolet and at Makkovik. Small mires are to be found occasionally even inside the brushwood belts. On the coastal tundra on the other hand the *Sphagnum*-mires are rather few.



Fig. 202. Cracks in peat hummocks, the so-called 'palsa', in a mire near Cartwright (469).

An interesting type of mire is that strewn over with groups of small peat hummocks, in Siberia called 'naljed', in Lapland 'palsa'. The peat hummocks are in Labrador of irregular outline, 1—1.5 m high and some 5—30 m in diameter; Fig. 202. They have come into existence by the swelling up of turf and sand, gravel or stone through alternate freezing and melting (cf. Thore C. E. Fries, Auer and Schostakovitsch; Hustich gives a comprehensive account of borings in palsas at Cartwright and at The Narrows). The peat hummocks have a thin vegetation of *Ledum*, *Andromeda polifolia*, *Empetrum*, *Vaccinium vitis idaea* and *V. uliginosum*, some *Rubus chamaemorus*, mosses, *Cladonia alpestris*, *Cetraria nivalis* and *Stereocaulon paschale*. Between the hummocks are scattered *Betula nana*, *Ledum groenlandicum*, *Chamaedaphne calyculata*, *Vaccinia* and *Oxycoccus* and in some spots the beautiful *Kalmia angustifolia*, living on the *Sphagna*, and on wetter fen spots some *Scirpus*, *Eriophora*, *Carices* and scattered *Menyanthes*; thus in the main the vegetation is the same as on the palsa-mires in Lapland.

In a mire 1 km south from Cartwright and 20 m above sea level the peat hummocks were only 1—2 m high and in the middle of July ice lenses were conserved in them at a depth of 25—30 cm. The same conditions were observed in the mires south of the Narrows at Rigolet; here WENNER made a closer investigation. HUSTICH discovered palsa hummocks in the mires toward the south from Double Mer and south-east from Pompus Head, on Huntingdon Island and in Pottles Bay. In some of them stems and stumps of spruce were found at a depth of about 40 cm, as at Cartwright, Pottles Bay and Makkovik. Thus they lie in the forest area close to the Atlantic seaboard. The mire type with palsas clearly indicates the nearness of the arctic climate region.

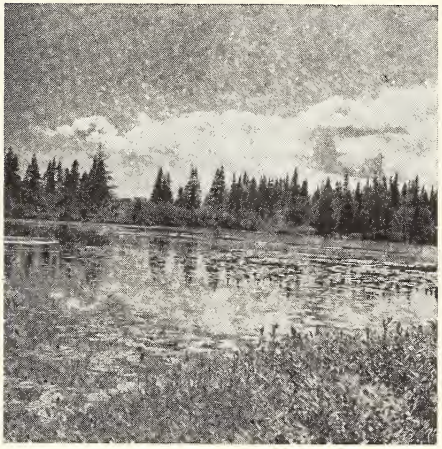


Fig. 203. A woodland pool in the St. Mary's River valley with *Calla, Nymphaea, Lobelia,* etc. (469).

The stratigraphy of the peat deposits of the country explored will be made clear in a treatise to be published in a Swedish series by my companion in 1939, Dr. CARL-GÖSTA WENNER, as soon as the samples collected have been analyzed.

The investigations concerning the stratigraphy of the Canadian peat deposits give us however a fairly good idea of the fundamental traits of the climatic changes registered in them during post-Glacial time, and these results can be applied for the time being to this part of the world also (16 c, 22 a, 22 b, 97 a, 846 a—846 c). Several types are to be distinguished: the raised bogs represent a type influenced by the maritime climate whereas the Carex-fens represent more continental types, and the succession in them is greatly reminiscent of conditions observed in Central Europe. It has been shown that the bottom layers of the Carex-peat fens register more favourable climatic conditions than those of to-day, because the grown-up lakes represent also southern swamps which have been covered later by grass-herb forest peat. In the surfaces of the bogs there are phenomena — e.g. retrogressive development — which to a great extent is due to a drying up and to the freezing processes producing strings, mounds and bog-ponds.

An analysis of the types of the plant communities of swampy ground based on aeropictures, would be interesting. By comparing the types of Labrador with corresponding types in northern Fennoscandia a fairly clear survey could be obtained of their phyto-geographical equivalents in the Old World. The possibilities which the Labrador types offer for culture must be elucidated before a systematic colonization of Labrador is embarked upon. Nor should the abundant *Carex*-fens in the interior be ruled out or placed outside the boundaries of the inhabitable world without special investigation.

Other reasons why the forests are of such poor quality.

The forests in Labrador lack any sign of care and attention, and are freely allowed to degenerate. Four chief causes seem to check their growth: poor re-growth and the podsolation of the ground, desiccation and forest fires. In addition there appears to be a continuous worsening of the forest, due to an apparent long-periodic degeneration (?) in the climate.



Fig. 204. Mossy black spruce forest toward the north from the Hudson's Bay Company's trading post Rigolet (in the centre of the picture) (468).

The influence of forest fires.

In Labrador as in Fennoscandia probably no part of the wooded area has not at some time or other been devastated by forest fires. Old records from Labrador contain descriptions of fabulously extensive forest fires. Hind mentions a forest fire raging in the upland of the Gulf of St. Lawrence in 1785, which extended 300 miles in length and probably 200 miles in breadth. »The Dark Days of Canada» were due to a rain of ashes, the result of a vast conflagration in the interior of Labrador. Other so-called 'dark days', attributed to enormous forest fires are reported also in 1814 and 1821; in these two years they were thought to be caused by the eruption of a volcano in the interior of the Labrador peninsula (325)! Also in days nearer our own, forest fires have caused extensive devastation (208, 434, 588, 519, 523, 851, 1119). At least one half of the forest area of the interior has been totally destroyed by fire within the past twenty-five or thirty years, Low stated in 1896; but this concerns the whole peninsula, and the figure is probably somewhat lower for our district. In the upper parts of the Moisie River valley, especially near the height-of-land,

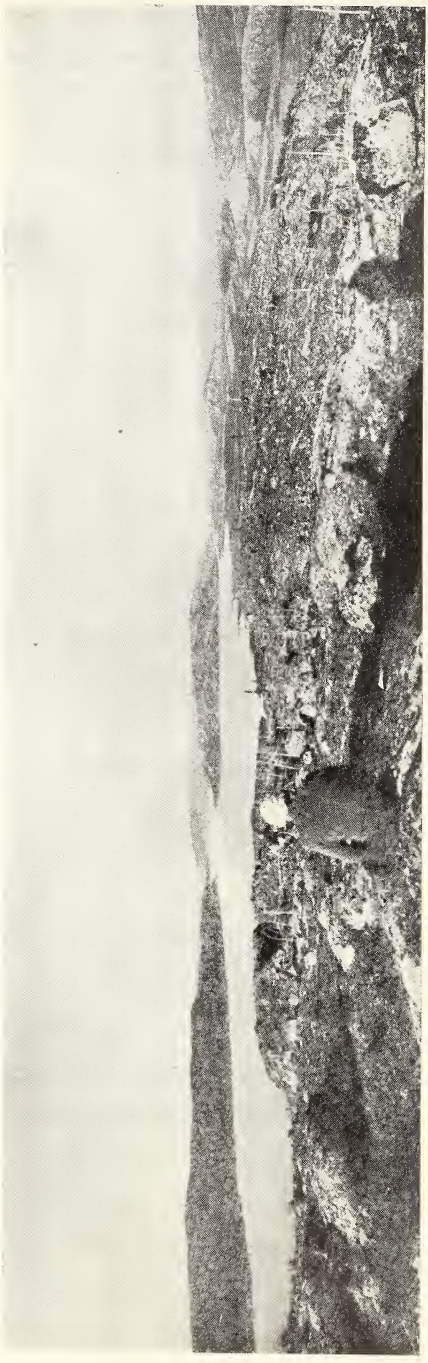


Fig. 205. Looking east over the eastern part of Double Mer from Pompus Head. The forest in the foreground has been destroyed by fire. Cf. Fig. 206 (469).

Hind found enormous areas where fire had wholly consumed trees, grasses and mosses, except for points of forest running down to the water's edge. Only here and there did the mosses and willows appear to be making feeble efforts to rise again in greenness and cover the terrible nakedness. Both birds and beasts seemed to shun so dreary a land. We must hurry through this desolate land, he said, painting its picture on our memories and its moral on our hearts (101).

Forest fires still ravage the interior of Newfoundland-Labrador every summer and appear to have done so from time immemorial. Areas recently devastated by fire thus occupy a considerable part of the total forested area. The fires often burn all through the summer, destroying thousands of square miles of timber land. Totally burnt out areas are frequently encountered while travelling in the southern half of Newfoundland-Labrador, especially on the Lake Plateau and in its vicinity, but also between it and the sea, at Naskaupee River and away towards Hopedale there is one of the largest burnt-out areas, and at Double Mer (Figs 205 and 206) Sandwich Bay, Cape Aillik and Makkovik as well as down towards the Gulf coast and in the

sparsely forest-covered south-eastern corner there are wide areas of burnt land, as for instance at Alexis Bay and Squash Run. The fires have been most destructive in the latter tract, because the forests in the south, near the coast, have in many places been highly destroyed by reckless cutting too.

The observation has been made all over Labrador that the burnt track of country — the *brûlé* — reached its maximum in those parts through which the main lines of communication run, such as Moisie, the Hamilton and Naskaupee rivers (HIND, LOW). It has in this way become a habit to blame the Indians for the forest fires.

It is a common practice with any group of Indians to create a great column of smoke on a hill or mountain when they wish to discover the whereabouts of their friends; this is answered by the others with another column of smoke. If such fires spread over the country a terrible destruction of forest and caribou food follows (435). DAVIES (208) gives a graphic description of such a fire in 1840, arising from the signal fire of one of his Indians; it finished so that whole mountains from top to bottom were one sheet of fire, making a noise like thunder; it completely destroyed an area some hundreds of square miles in extent. No doubt fires have become much more frequent since the Indians learnt from the Europeans the use of the friction match, and there is little doubt that this is the reason why a considerable portion of Labrador has become uninhabitable, states HIND (435). On the other hand, he also remarks that generally the Indians are very careful to put out their fires before they leave their summer camps. It is believed that the destruction of the carabou lichens by such forest fires has

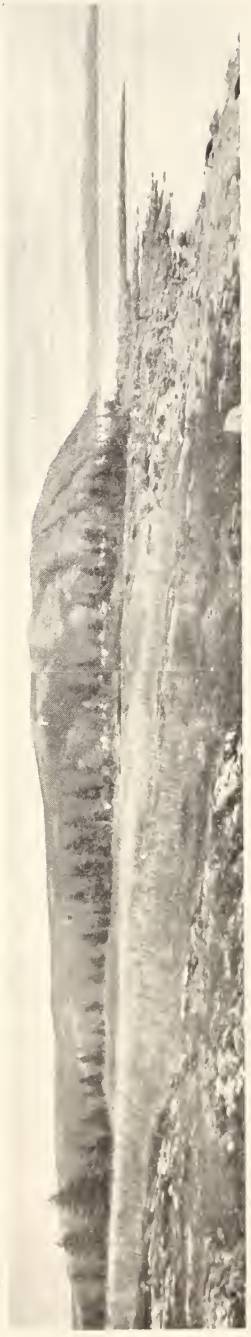


Fig. 206. Looking west over Pompus Head (in the centre) and the inner part of Double Mer (to the right hand). Cf. Fig. 205. Photo the author, July 16th 1937.

driven the main body of carabou to the north-west and north parts of the peninsula. HIND (435) said further that having seen the large areas of burnt land, he felt sure that the nomadic Indian race must disappear with the destruction of their means of subsistence — the caribou. Yet, what do we find to-day: a stock of nomadic Indians scarcely less in number than 80 years ago!

Of course negligence lies in the blood of every child of nature and therefore it is not surprising that it has become usual to blame the Indians' signal and camp fires for the burning of the forest. Yet in most cases it was the lightning which kindled the spark. For my part I find it very difficult to believe the many stories which make out that it must have been just the Indians who are responsible for the forest fires. It is said that when the young woods again grow up on the charred land it is the aspen which comes first, that is the tree from which canoes are made, and in other places the Indians are said to have started, 'berry-farms' by burning the ground, etc. Perhaps it is necessary to see a forest fire roaring forward over the wastes to be fully persuaded that the Indians take good care not to run the risk of setting fire to the trees. A forest fire is indeed a terrible sight. The flames leap from the top of one spruce to another, burning branches and beard-moss are borne far away and then fall down into the dry undergrowth and tongues of flame at once begin to lick the ground. The heat causes the resinous matter to ignite, a new tree takes fire and the flames crackle up the stem, the spruce flashes into flame from top to bottom almost instantaneously. The amazing speed with which fire moves, chasing before it everything that can flee, four-footed animals and birds, makes it impossible to escape by speed from an approaching sheet of flame in Labrador, as pointed out by DAVIES (208). The Indian camp must summon all their power and skill to rescue themselves. Soon there lie only twisted masses of reeking and glowing tree-trunks in all the barren waste of naked rocks and boulders from where burnt stumps of trees rise. All life has been wiped out. The stark, naked skeletons of the old forest stay all about for years and impress one with the dreariness of the scene. Then the burnt fields may lie dead for many decades. The animals shun them and therefore the Indians have nothing else to do than to move after the furbearing animals to another area and try to develop a new hunting strategy (cf. p. 608). Does a sensible person now believe that an Indian will allow the fire to run riot if he can check it!

In any case the area of burnt land is said to increase annually and nowadays includes extensive, connected areas. The hopelessly monotonous sooty-grey surfaces of mineral soil mixed with charcoal and with trees bleached by years of lifeless exposure here and there are only broken by some rocks burnt

white or boulder-strewn slopes between which some dark tarns glimmer. Round the mires lie narrow strips of half-naked land with small patches of wind-stunted spruce thickets which follow the depressions, but they too seem to be shunned by the animals.

In such places where the fire has raged and the earth is wholly burnt it will be decades before vegetation can take root and humus forms. Major CARTWRIGHT (134), one of the foremost experts of Labrador, gave at the end of the 18th century the following description of how nature's urge to growth begins here: when the spruce woods are burnt down, *Ledum latifolium* is generally the first thing which comes up, currants follow next and after them birch. As the birch plants usually spring up within three of four feet of each other, they are soon drawn up and make most excellent hoops, about which time the spruces and balsams will be already growing among them to the height of 2, 3 or 4 feet, when the 'Indian-tea' and currants will be nearly killed. The birches begin to show consumptive symptoms by the under branches dying, and as the stronger ones prey upon the weaker, the latter decay and what remain grow to fairly stout trees. Yet, as they are not thinned at the proper time it is almost impossible to find a sound one among them. At length the conifers overtop and kill the birches, and when they are not too close together and the soil suits them they grow to a great size; a really luxuriant forest can grow up with trees of a size and density which would be no descredit to countries with better soil and climate. However, as the soil is poor and thin and the stems too close together, the trees are black, crabbed and moss-covered and consequently of little value.

Thus areas of birch and aspen are everywhere conspicuous evidence of the tracks of the forest fire, as for example at Birch Lake on the Lake Plateau. Cf. Fig. 196.

From what I saw in the interior of the country the second growth forest is better than the original. The old, degenerate spruce growth, with its thick moss bottom in which the seed cannot reach the soil, is reproduced only by offsets mostly from fallen trees and will be contorted already from the very beginning and never become first-class timber. On the other hand, on the burnt areas young trees are always sprouting and growing up to replace those destroyed, so that growths of all ages are met with at intervals throughout the country.

In my opinion, just by a reasonable use of burning the Labrador forests can be improved. Meanwhile, HUSTICH stated that in the coastal district there is no exuberant young forest to be seen, the second growth is remarkably poor

and the humus has been almost entirely destroyed by the fire. If this is due to some unfavourable climate conditions, to the scanty occurrence of leaf-bearing trees, or to some other cause, can only be proved by special investigation.

The drying-up of the forest.

Forests with a greater or less number of trees wholly or partly dried-up are a common phenomenon in Labrador. In many places there is evidence that the stems were previously much thicker. At Mary's River trunks and stumps measuring 40 cm in diameter show that the forest had previously trees of a larger size than today. Now on Huntingdon Island about 50 per cent of the highest trees have dead tops. At the narrows of Rigolet some 30 per cent of the higher trees have dead tops (469). At Makkovik, on the mountain slopes, dry trees form about 30 per cent of those between the sea shore and the barren land. At Cape Aillik there are completely dried spruces 10 m high and 0.3 m in diameter. Fine timber has grown at Cape Aillik; HUSTICH reported stems and stumps of spruce 50—60 cm in diameter with rings for some 200 years. Here the re-growth is only of the brushwood type. At Okak, where to-day there is scarcely anything but bushes, COLEMAN (157) reported that the fairly thick stumps of spruce must indicate a larger growth in the past. The partly or totally dried trees will die soon. This signifies a degeneration of the growth.

Dried-up forests probably occupy about 25 % of the woods of low and medium height. Living and dried trees are mixed in about equal amounts in the dry coastal forests between Sandwich Bay and Nain, while in the inland forests on the Lake Plateau the number of tree-skeletons is greater than the living trees on many dry places. The drying-up process begins at the crests and in many cases has no connection with either parasites or fires. It may therefore be considered as originating in a change in the climate which has become unfavourable for the forest growth; not so very long ago it seems to have become colder and at the same time drier than before (cf. p. 401).

As regards the poor re-growth the dimensions of the decaying wind-fallen trees and stumps in many places in the low-grown woods show that the present trees are a degenerated form of the more ancient forest constituents. Areas cleared of trees in the outermost coastal districts have in many cases become coastal tundra. When in the present areas of bare hills stumps are found with a diameter double as large as the living trees around this indicates not only the degeneration of the forest but also the recent recession of the forest boundary (stumps were observed even out on Cape Harrison). PRICHARD reported that on the mountain tundra east of Indian House Lake, two days'

march from the river, he found some small spruce and several large dead trunks; there the height above sea level is about 2.000 feet; on the mountain tundra away towards the sea in the east there were merely patches of alder but no other bushes or trees.

We may thus assume that Labrador during the post-Glacial warm period was more extensively covered by forest than to-day. This is already clear from the sequence of the beds in the palsa bogs. The finding of stumps and roots in bogs where at present there is no forest growth, like the finding of large trunks far beyond the present forest boundary, lead to the conclusion that a regression of this boundary has occurred in fairly recent times (cf. p. 358). The same may be concluded from the fact that dried-up trees are interespersed in the forests especially at higher levels above the sea. Even the occurrence of the poor second growth on burned surfaces near the coast witnesses to a change for the worse in the forest reproduction. HUSTICH thinks that if the settlers in south-west Greenland during the Middle Ages took their timber from Labrador the trees there must have been taller and the forests more luxuriant and probably stretching farther north along the coast than now.

It seems to the writer that all these facts must be due to a change of climate unfavourable to forest growth which is still (?) proceeding. To verify this, however, the bogs north of the present forest limit must first be investigated.

Another cause of the poverty of the forest is the meagreness of the soil. The coastal areas beneath the late-Glacial highest marine limit (cf. p. 235) are to a great extent bare rock or covered with stony morainic gravel, in a few places sand; outcrops of clay deposits are extremely rare. Land which the sea has never flooded is covered by boulder-strewn till, from which the finest particles have been partly washed out by Glacial meltwater streams, or fluvioglacial deposits in situ. The natural fertility for tree growth of such a land is feeble. Moreover the rock surface has been extensively uncovered by slidings and solifluction, and considering also that the soil is thin between the barren rock surfaces and the mires, and the formation of humus very slow where it has been destroyed by fire, it is clear that the forest in general must become meagre. Another cause is the rather early decay of the forests on account of the podsolation. Nowhere in the world have I ever seen podsol formation attain such a size as around the inner part of Sandwich Bay, where limonitic hard-pan can be seen which is 1 m and maybe somewhat more in size. Such a podsol naturally in time compels the productive forest to

disappear: the hard-pan prevents the trees from sending their roots deep into the ground and they therefore form a network close to the surface and cannot stand the stress of the storms. In such places a forest can never grow tall, it only produces amazingly poor and wasted types and easily forms rubbishy heaps of decaying fallen stems and twigs.

The hints given above make clear the reasons why the forests are lower and poorer than what the climatic conditions seem to warrant. The care of the forest industry would justify a systematic investigation of the growing period and how to destroy the thick covering of moss which prevents ventilation of the soil, and retains the humus acids and the frost.

Remunerative Forests.

It is clear from what has here been stated that the remunerative part of the wooded covering of Labrador is far less than might be assumed from looking at the map, Fig. 156. Yet spread over a large area timber resources are considerable and one thinks it is the chief of the natural resources. In Labrador trees worth the cutting are mostly located near streams in sheltered valleys (995). They have only been utilized at some few places at the heads of the bays.

According to the Newfoundland Royal Commission of 1933 (679) the interior is but little surveyed, but has been estimated to be about half covered with timber, and that about 30,000 square miles is forest suitable for commercial development. According to the same source the total area of Newfoundland-Labrador is 110,000 square miles. The author's estimate varies considerably from this, when he considers that the forest land is not only broken up by lakes and watercourses, bogs and fens, patches of tundra forest and thicket-woods, but also by extensive burnt areas, areas unfit for growth and patches of dried forest where 50 per cent and more of the trees are standing dried-up trunks. All this shows that scarcely more than a roughly estimated 20 per cent of even the area shown on my map as »high forest area of economic value» can really be called useful forest, that is to say timber forest with trade value.

As already stated (p. 369 sq.) trees of any notable size are rare at the outer coast. Yet the growth in the reservation near the Missions' stations at Makkovik, Hopedale and Nain shows that conditions do permit tolerably good forest to grow in sheltered places even so near the sea. Reichel (434) reported from

Nain in 1861 larches 40 feet high and further inland some 60 feet high. Freitag showed him a clump of firs 2 feet in diameter which, according to his calculations, must have been growing 317 years (434). In compensation the interior presents much more attractive conditions and a marked improvement of the forest is apparent on advancing only a short distance inland. The trees increase in height as one ascends the rivers from the Gulf coast; Hind reports balsam-poplar and birches at least 70 feet high, and that approaching the rapids in the Moisie River 14 miles from its mouth spruce and birch become handsome trees, frequently 18 in. in diameter. Further up the valley at 1.700 feet above sea level birches were found no less than 15 in. in diameter, and some spruces averaged 18 in. in diameter and about 50 feet in height. Near the Sea-Way-Sini-Kop portage the birch grows to a large size and the spruce are two feet in diameter; where patches of drift remain the trees are tall and of luxuriant growth, he says. Bryant stated already in his time that he found a notable increase in the size of the spruces and other firs as he approached the interior by the Hamilton River, but in general the trees were not imposing.

Yet there are also at the present time trees of considerable size to be met with.

At the saw-mill at the upper end of the first lake above Kipekak Bay I measured a black spruce somewhat over 40 feet long, a white spruce 94.5 feet long and 36 in. round the root and another 44 feet long and 16 in. round the root which was 65 years old. The largest timber cut here is black spruce. The biggest log was 30 in. thick and was made into 6 logs of 12 feet. The top was about 8—10 in. thick before the tree forked.

Around the lake where the Susan and the Beaver rivers unite there are branchy black spruces 85 cm in diameter and about 25 m tall, also birches 30 cm in diameter and 15 m tall. At the North West River I counted about 150 rings in a white spruce about 90 cm in diameter. According to Kindle white spruce 32—40 in. in diameter at a height of 4 feet are not rare at Mulligan. Townsend (950) stated that the height of the forests increased inland at the Natashquan River to 50—60 feet at the 5th cataract; a balsam spruce there was 64 in., a black spruce 43 in., and a birch 72 in. in circumference. A birch 7 in. in diameter was 83 years old, a 62 feet black spruce 1 foot in diameter was 113 years, and a 25 feet larch was 62 years old. Townsend further states that the forests there grow much more quickly than on the east and south coasts (947, 948, 950). On the other hand, at Battle Harbour a balsam spruce 13 in. high was 54 years old and on Eskimo Island a black spruce 6 in. high was 53 years old. At Makkovik Hustich measured some spruce stumps:

he counted 180 rings in a diameter of 45 cm, 160 rings in a diameter of 25 cm and 70 rings in a diameter of 17 cm. A larch 30 cm high on the brushwood line had 38—40 rings, and a diameter of 2.5 cm; the stem of another bush was about 1 m high with 25—30 rings and a diameter of 2 cm; the variation in height is due to the different exposure to wind.

The trees grow very slowly: a planted seedling fir at Nain after twenty-one years was not more than knee high (476).

The forests of the interior, of middle height or even low, have stems measuring 6—14 m in height and 0.2—0.6 m in diameter. In many cases from a distance the tree growth looks like a real forest but on coming to the place it is revealed as a valueless thicket-wood 2—3 m in height, for instance at Davis Inlet; cf. Fig. 265. Bad natural drainage and poor soil on the flatter land prevent the rise of thick and high-stemmed woods especially on the Lake Plateau. For this reason the best and tallest forests are found on the fairly steep valley sides and on the slopes of the mountains. The degenerate low forest with its twisted stems of black spruce 5—8 m high and its underbrush chiefly of balsam spruce 2—3 m high is practically speaking impenetrable; nor has it any value except as fuel.

The dimensions of timber seem to depend less on latitude than on the quality of its locality, especially the soil. Low found that near Petitsikapau Lake the greater height of the trees was due to the richer soil of the area, and in the valleys white, black and balsam spruce are frequently met with over 24 in. in diameter three feet from the ground (588). MacLean pointed out that the district around Erlandson Lake [?] in lat. 57° is remarkably well wooded even to the tops of the highest hills; he says the same about the district to the south: the river banks are covered with large, white spruce. On the other hand, on flat, badly drained, morainic ground the forests are comparatively poor, thin and stunted (610).

In many wooded districts where the growing conditions may be assumed to be comparatively good, but which have for a long time been spared fires, the covering of moss has grown undisturbed more and more thickly and the trees degenerate. It is now in such places not seldom found some 0.3 m thick. The ventilation of the ground is hindered and the supply of oxygen to the ground water is checked, so that the roots have been injured and the rot has already begun to travel up the stem. In the district around the lake into which the Susan and Beaver Rivers fall the forest seems at a distance to be specially good and well-grown — cf. Fig. 194 b —, but when felled 40 % of the pulp wood have the core attacked by rot. It seems to me that the only possible

cure for the general paralysis in such forests is a systematic felling and burn-beating so that the sun and air can again penetrate the soil and destroy the poisonous humic acids. Such felling, however, demands both scientifically based judgment and practical experience; only a specialist should carry out such work.

Yet these forests still contain a considerable amount of accessible useful timber. But system is necessary also in felling. At the present time every one seems to play havoc in the woods as he chooses, as if they were something evil to be hated by humans. Large mills have been established near the head of Hamilton Inlet and then abandoned; but it is not difficult to understand the slight success of such enterprises. On the other hand the small scale saw-mills set up in several places southwards from Adlatok Bay seem to have been successful.

It will be interesting to see how the forest industry will develop in Labrador. The spruce is especially suitable for pulp and undoubtedly there is also here much that can be used for railway ties, telephone poles, pit-props, fuel, charcoal, etc. But as the sailing period is so short and other lines of communication are non-existent, the production must be industrialized and the felling concentrated. Under these conditions it is a question to what extent the export can bear costs of production also at a period when the timber on the river banks has been consumed and the raw material must be taken from farther inland. Already one of the undertakings shortly after its start fell into difficulties in completing a contract for the delivery of pit-props.

The forest remnants at the Atlantic seaboard need protection.

Observations indicate (cf. p. 358) that previously the climate was more favourable for forest vegetation. The woods once reached much closer to the sea and higher up the hills, and the trees were thicker and taller too in many places. Moreover, this deterioration in the forest growth is fairly recent. The dried-up forests may show that the climate continues progressively to become more continental; also the regelation phenomena on the surface of the bogs — cf. Fig. 201 — prove that the climate is colder than when the bogs were first formed.

It must therefore be assumed that the limit of the woods at a not very distant period was much higher than at present all over the peninsula. All the valleys leading up from the sea to the west, which did not reach above the forest limit at that time, became covered by connected tongues of forest from the west towards the east. In contrast the valleys of which the passes lay above

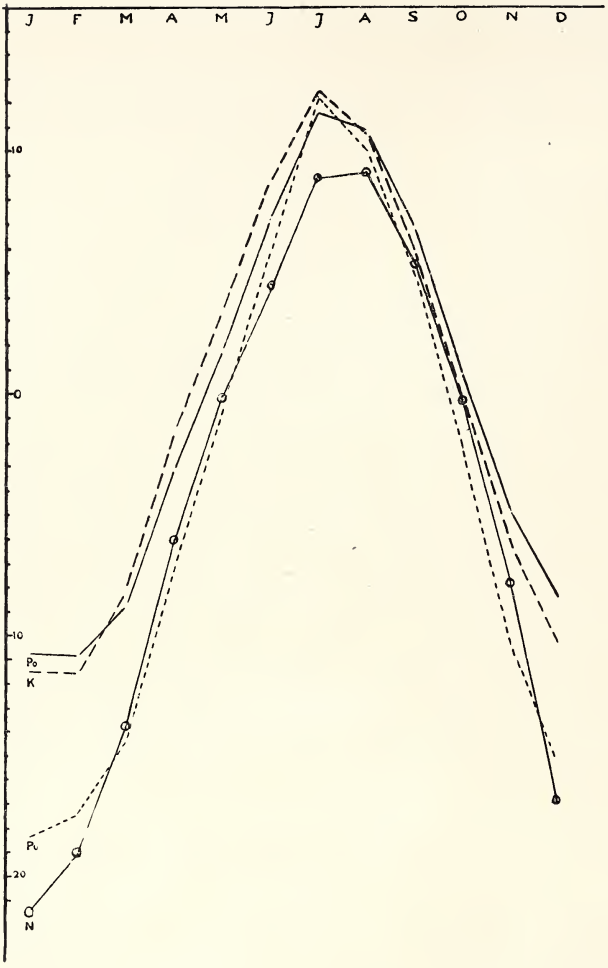


Fig. 207. The monthly mean temperatures at Nain (N) and Pusstozersk (Pu) (469).

the forest limit were not accessible to these invaders. Then later, during the general regression, the tree-limit sank and the forests disappeared from the passes. No longer were any migration routes available for the trees between the wooded valley of the George River and the valleys draining into the Atlantic (cf. 1021). This consideration explains why there are still some isolated remnants of forests preserved in certain valleys (see above and Fig. 156). If this assumption is correct, many of the isolated copses in the valleys at the northern part of the Atlantic seaboard must be considered relics, preserved in places well protected against the winds. An example of this is the spruce forest about 8—10 m high discovered by HUSTICH upstream in the valley of the river debouching into Pottles Bay. Another such remnant was discovered by WHEELER in the valley of the Koroksuahk Brook towards the east-northeast from the George River coast. Furthermore the wood of the Naparktok fiord belongs to these remnants. This may make clear the need to protect such forest reserves while waiting for better climatic conditions when they can again begin to spread out.

Correspondence between the vegetation and climate of Newfoundland-Labrador and upper Petshora.

The regional distribution of mires in Labrador is in harmony with the distribution of its atmospheric humidity and both decrease towards the north. On the other hand, this distribution emphasizes the integral character of the climate and makes it possible to estimate roughly the prevailing climatic conditions of the interior, where no systematic meteorological investigations have been made. This and the general character of the forest vegetation assists a rough coordination of Labrador with districts in the old world where the same mire and forest vegetation types are to be found.

There is to some extent a counterpart in the old world to this American bio-climatic province in the Petshora district in the north-east of European Russia, called the 'corner of Siberia in Europe'. I have already pointed out on my vegetation map of 1938 the agreement between the climatic conditions of the forest area of Newfoundland-Labrador and that of upper Petshora. Later on HUSTICH, in his diagram 1 (1939) confirmed the amazing conformity between the temperature curves of Nain and Pusstozersk; Fig. 207; the mean range for both stations is 30.6°, but the extremes of the former are about 3 centidegrees lower. Besides this on the basis of the studies made by SAMBUK (Trav. Mus. Bot. de l'Acad. d. Sc. d. L'U. R. S. S., livr. XXII, 1930; ibid. 1932) of the vegetation of Petshora's *regio-silvatica* many points of close resemblance are shown also to exist between the varieties of forest growth and the behaviour of their constituents in these two countries (cf. HUSTICH, p. 53 ff). Cf. Figs 189—191.

Nowhere else in Europe does such a correspondence with Labrador forests exist; and this may give some idea of the general climatic conditions in Newfoundland-Labrador (cf. my map of 1938). Even the coldest and most continental tracts of Fennoscandia, for instance northern Sodankylä and Enontekis have a somewhat warmer and fairly less continental climate than Newfoundland-Labrador on the average. Cf. also p. 328 sq.

Phenological remarks.

Considering the relatively southern latitude of Labrador it is astonishing that the solar radiation conditions are not more favourable to vegetation especially along the sea board. At the eastern parts of the north shore of the Straits of Belle Isle — in the latitude of London — we found close to the sea a semi-arctic heath flora, as already stated (p. 360). Towards the west, in the country-side, this condition is somewhat weaker.

From a phenological standpoint there is in summer a considerable difference between the degree of the development of the vegetation in the interior and on the coast. HIND stated that in the Hamilton River valley in the spring and the fall of the year vegetation is 20 days in advance of that of other places. Between the North West River and Indian Harbour, a distance of some 120 km, HUSTICH estimated, on the basis of the flowering of plants, etc., in 1937, that the coastal district was about 2 weeks behind (469). According to information from the late Dr. PADDON there is about 2 weeks difference in the appearance of the leaf shoots between the North West River and St. John's, Newfoundland. The farther north one comes, the later naturally the vegetation wakes to life after its winter sleep.

Midsummer comes with a rush when the snow has melted in July, PRICHARD (761) writes of the hinterland of the Nain district. Grasses and leaves grow almost visibly, the wild cotton soon flings out its little white pennants and millions of berries soon ripen on the ground. But suddenly one day late in August everything is transfigured and the first snow falls. There may and will be fine days after that, but the country is no longer young; the marks it has received can only be effaced by spring. Usually a great storm is the herald of winter. In 1910 on the plateau between the Atlantic and the George River PRICHARD found that a gale on the 27th of August had beaten the grass flat and it lay in yellow wisps and tassocks.

On the mountain tundra the flowering plants suddenly spring up from the sodden half-frozen ground, burst into bloom and wither away. They live in a hurry, the summer lasts only six or seven weeks.

Future research and the available observation material.

From what has been here recorded it can be concluded that only in a few spots are the dendrological and in a wider respect botanical conditions somewhat known in Newfoundland-Labrador. Nevertheless, botanically the country has a certain interest and is even extremely attractive from a plant-geographical point of view. It will for instance become a classic district for future students of plant migration. For general studies also in plant geography the peninsula is very suitable. It is still a purely primeval country and antropogene secondary formations can practically speaking be ignored after leaving the few communities at the coasts: Nain, Hopedale, Indian Harbour, and Cartwright, etc., where some adventitious plants have been noted: *Echinospermum lappula, Matricaria discoidea, Polygonum aviculare, Sisymbrium sophia, Sinapis alba, Potentilla norvegica, Achillaea millefolium, Hordeum jubatum*, etc.

As a curiosity it may be mentioned that rhubarb still flourishes at the Hudson's Bay Co. post at Fort Naskaupee, beside Petitsikapau Lake in the heart of the peninsula, which was deserted 70 years ago.

The botanical material collected in Labrador is almost wholly of a floristic character.

The pioneer collection was started by the Moravian Brethren in the 18th century. In 1830 MEYER (648) published his Flora of the East Coast of Labrador including 169 different vascular plants, many of them collected by the missionaries (646). In the last 150 years the Brethren have continued their botanical research, especially HERTZBERG, WEIZ and HETTASCH. PORSILD in 1935 (755) gave an account of the work of these plant collectors. But there are also some exsiccate collections made by occasional visitors especially at the southern and eastern coasts of Labrador (45, 52 a, 57, 256, 1099 a).

For the eastern coast should be specially noted LOW (588, 593), DELABARRE (218, 219), COLEMAN (157), SCHRANCK (832 a 1), SORNBORGER (256 a), WOODWORTH (1053, 1054), BISHOP (81), WETMORE (1016), ANON. (1099 a) and ABBE (1). For the farthest north, the Killinek district, we have HANTSCH's list (400), made with the help of BORDON's (93) information (from 28th—29th July 1904) [cf. POLUNIN (754 a—754 f)]. This list is of special interest because HANTSCH with the assistance of the missionary HETTASCH added the Eskimo names for the plants (518). For the mountainous districts in the north, Torngak to Kaumajet, there are lists accompanying the works of DELABARRE (218, 219) and COLEMAN (157), the latter including both the locality, the date and the frequency; cf. also WAGHORNE (986) and WOODWORTH (1053, 1054). ABBE (1) has also left an excellent, detailed report, but this too is mainly of floristic interest.

For the Lake Melville district the following works should be consulted: KINDLE's (519, 523) and MACKAY's (607); for Hamilton River BRYANT (105) and LOW (588) give information; for the inland LOW (588), BELL (56, 57) and MACOUN (616, 618, 619, 621) should be consulted.

For the southern coast of Labrador there are the studies of HENRY BRYANT (104), HENRY G. BRYANT (107, 108), BRUNET (104) BUTLER (117), FERLAND (252, 256, 256 a), JAMES (484), LEWIS (572), LOW (588), MACOUN (617, 619), PACKARD (708, 716), REGAN (785), RICHARDSON (797), ROBINSON (806), SAINT-CYR (825, 826), ST. JOHN (827), STEARNS (882), TOWNSEND (948, 950, 957), VERILL (980), MARIE-VICTORIN (628 b) and ANON. (1107).

MORTON (667a) should be consulted with regard to the tree flora, and PINCHOT [?] (1102), MASON (632) and ROSS (814) with regard to the forests.

The conclusions drawn from the exsiccate collections of the Finland-Labrador expedition including the eastern coast between the St. Mary's River and Hebron and also Sandwich Bay, Lake Melville and Double Mer will be published later on in the *Acta Societatis Pro Fauna et Flora Fennica.*

It should also be remembered that important and comprehensive material for dendrological studies has been collected by the functionaries of the lumber company which was working at North West River during the years 1937—1939. Many thousands of aerial photographs have been taken by them for the detailed examination of the forest vegetation of the Lake Melville drainage area.

There thus exists a considerable amount of floristic material although it must be borne in mind that FERNALD said (DELABARRE) that nearly all the published lists of Labrador plants contain errors and therefore the old lists need critical revision by competent people. Selected and well annotated collections may, if submitted to reliable experts, extend the list of species and varieties of plants. Labrador is no longer the inaccessible land of mystery it was a few decades ago; the great wild garden can be intimately known. There are no doubt many undiscovered species; every new visit has resulted in fresh finds.

All these collections are important more or less directly for the floristic plant geography. Yet the lists available in the literature quoted give to a person more familiar with botany a fairly good conception of character of the plant life and its associations in the districts concerned. Moreover, JAMES (489), FERNALD (258), and ABBE (1) give some important plant geographical — plant historical features provided by the flora. On the other hand, a systematic plant geographical — ecological account, based on a special investigation of the plant-sociology and the distribution of the plant-associations has never been made. This want is discouraging to any one desiring to investigate the quaternary plant paleontology by means of pollen analysis. The attempt made above by the writer is based upon occasional observations and should therefore be regarded merely as a provisional sketch.

From all this it is clear that a great deal of work remains to be done for the acquisition of an intimate understandig of the adaptation of the plants to their environment, their relation to the food supply, soil, climate and insect life of Labrador. Also the plant historical questions and the plant migrations (p. 353 sqq.) await explanation, and they are probably at present the most important contribution which Labrador can make to the science of botany.

Not until all this has been done can the complex plant life of Labrador be satisfactorily known.

Part. V. The Animal life.

Some mention must also be made of the animal life in Newfoundland-Labrador. Unfortunately no one in my expeditions was a professional zoologist and no time was devoted to special zoological work; therefore no new contributions will be found here to the knowledge in that sphere. However, to understand the mode of living of the country's habitants a few pages will be devoted to this topic.

Most of the explorers of Labrador have probably been surprised at the scantiness of the higher animals and especially the mammal stock in Labrador. In this desolate wilderness there are few capable of producing a sound. Can any life exist in the heart of this incredible barrenness? PRICHARD asked himself on the tundra, and HIND was surprised by the awful silence of the forests. Standing on the heights between the Moisie River system and Ashuanipi Lake he wrote: long and anxiously I looked round in every direction to see if I could distinguish any signs of animal life, but without success. No sound was audible except the wind. . . Not a bird, or butterfly, or beetle appeared to inhabit this desolate wilderness; the silence of the lifeless surroundings depresses the spirit and saddens the heart. Even the visitors who travelled so that they had time for hunting have been of the opinion that the game supply is not abundant today. Several travellers who depended for provisions on the local game, have perished from starvation. It may be objected that their visits were badly timed: in the life of most animals periodical and other migrations (149, 243) occur because of epedimics, the need to procure the necessaries of existence, for instance, after forest fires, to escape from beasts of prey, breeding conditions, etc. and in some years game is exceedingly scarce. The trappers are very familiar with these things, they know well that the animals killed by man each year vary greatly in number. Yet it is certainly true that in the daytime, especially in the dense forest area, mammals are rarely seen; it is not until the singing of the birds has ceased that the wild beasts begin to move and feed and hunt. But even so I consider that the mammal life is scanty in the forested area of Newfoundland-Labrador.

Mammals.

Nearly all the fur-bearing animals of eastern North America are more or less plentifully represented in Labrador.

In the deep, solitary woods live the beaver and the muskrat, the mink, the otter, and the marten.

The beaver (*Castor canadensis*)[1] belongs to the shy and watchful inhabitants of the great wildernesses; it lives in the solitude of remote river valleys, the bottoms of which are marshy and covered with ponds, and on the slopes of which grow birch, alder, aspen, and willows, these forming its food. The Labrador beaver is a very cautious animal; yet the rich, long grass growing in the centre of the 'beaver meadow' and the fresh traces on the barked willows, 'beaver cuttings', reveal its presence. The position of its hut is easily discovered from the white, gnawed chips which come floating down the streams. And in the twilight the heads are seen gliding soundlessly over the surface of the pools. About August the whole colony collects, the old fellows having lived by themselves during the summer. In general the animal is rather scarce, perhaps on account of the great thickness of the ice on the lakes (56).

The muskrat (*Andatra zibethica*) may be called the beaver's house-rat, and it generally keeps extra close watch near the beaver's hut. Its presence is betrayed by the bitten grass and in winter the long rows of snow-covered rat mounds built of earth and grass around the push-up hole in the ice indicates where it lives. Here it swims from the one hole to the other; but if the water flows during the winter the inhabitants of the holes are sometimes frozen in before they can escape up on the ice. On the ice the brown-skinned creature falls an easy prey to foxes, mink, and owls. A trapper can take more than a thousand rats in a single winter.

The mink (*Mustela vison*) and the weasel (*M. cicognani*) with the otter (*Lutra canadensis*) keep to the streams and live on fish. The mink is rare north of the Hamilton River's basin, but is rather numerous round the mouth of this river. The otter is mostly a wanderer, while the mink is more stationary. 'Otter meadows' — *nishikun* — and otter tracks in the snow reveal its travels.

The marten (*Martes americana*) lives in the deep spruce woods, feeding on mice whenever possible; but it also eats birds and eggs, and the trappers say that it even pulls out the bait from the traps with impunity. Its extension to the north is limited by the southern boundary of the semi-barrens. The

[1] The nomenclature is that used in ANTHONY, H. E. Field book of North American mammals (XXV + 625 p.) (1928).

darker and thicker the black spruce woods are, the darker and richer are the skins of the marten living there — the so-called 'Labrador sable'. Often it lives in colonies, and a trapper can make a fine catch when he finds one such and sets out his traps. But the following year if mice are scarce it may happen that there are no marten left; the Indians say it has emigrated, and he adds: 'as soon as the marten go the company will go too and the Indian will starve or die off like the marten or the rabbit in the bad years'. The periodical disappearance of the marten was noticed long ago (Rogan Ross). What becomes of them is quite unknown, they are never found dead. As early as 1863 Hind stated that the very valuable Labrador martens were no longer numerous. However, a considerable number are still captured in good years and according to what Mr Ralph Parsons, the expert fur commissioner of Hudson's Bay Co. told me there is no reason to fear that they will die out. Providence appears to have implanted in them some wandering instinct by which the total destruction of the species is prevented Hind remarked (434).

The red squirrel (*Sciurus hudsonicus*) is as a rule common at all times in the woods, while the northern flying squirrel (*Glaucomys sabrinus*) is usually found in the forests of the lower part of the Hamilton River valley.

The arctic hare (*Lepus arcticus*) is confined to the barren and semi-barren land. It is found southward as far as Hamilton Inlet.

The varying hare (*Lepus americanus*) is found all through the forested region, though in some years it seems to be wholly absent. Whether this is due to the infectious throat disease which once in five years practically exterminates this animal (588 a) or to its migrations (243, 149) is difficult to ascertain. The hare seems to undertake long journeys and every seventh year is specially numerous, as can be recognized by the nibbled bushes. — The inhabitants of Labrador rarely know the name 'hare': the hare, says a trapper, is an animal very like the rabbit.

The squirrel and birds supply food for the marten, while the hare and the smaller rodents, the lemming (*Dicrostonyx hudsonicus*), and the mouse (*Peromyscus maniculatus*) and the jumping mouse (*Zaphus hudsonicus*) supply the foxes with food.

The best protected of the forest animals is the porcupine (*Erethizon dorsatum*); if the spines stick into the skin they must be drawn out or they will work their way into the more delicate organs and will poison them; many dogs die in this way. The presence of the porcupine is betrayed by the gnawed bark of the black spruce, especially towards the tops. Porcupine and field

mice can be something of a nuisance; they sample the food and gnaw holes in the side of the tent (995).

Outside the forest the principal fur-bearing animals are the caribou and the foxes: red, cross and silver and black fox, the white and the blue fox; besides these there are the wolverine, the wolf, the polar bear, and the barren ground bear.

The very fearless, silky mountain fox, polar fox (*Alopex lagopus*), is always found on the tundra and wanders thence in packs down towards the forests. The real home of the white fox is on the seashore or on the drift ice, where it lives upon the remains of the polar bears' meals and the bits of seal left by the Eskimo. But on the tundra it lives upon the lemming and the remains of the wolves' meals. Cf. Fig. 208.



Fig. 208. White fox in the trap near Cartwright. Photo Mrs K. M. KEDDIE.

The Labrador red fox (*Vulpes rubricosa*) is found all over the peninsula, especially at the shores of lakes and watercourses and even more so on the seashore. Of the rare color phases found here the black seems to be surprisingly predominant.

The blue fox (*A. lagopus* var. *fuliginosus*) is a great rarity on the southern half of the Atlantic coast.

On the tundra as in the forests the eternal struggle for existence is carried on; its motto: hunt or be hunted!

The barren-ground bear (*Ursus richardsoni*) is restricted to a narrow area in the north and is not plentiful — if found at all in these days —. At Barren Ground Lake tradition says that in 1894 an Indian killed the last recorded specimen of the red or barren-ground bear (761). Once it was common enough to keep the Indian in wholesome dread of its vicious disposition when roused. This animal is of much zoogeographical interest; it is difficult to explain how it lived in such an isolated place, as it is not found in the intermediate country between this and the plains of the far west (cf. 56).

The black bear (*Euarctos americanus*) rarely ranges beyond the woods and has never been found as far north as Fort Chimo. It is a peaceful, playful animal providing not so small an addition to the family larder with its flesh. But the black bear is extremely inquisitive and inclined to play pranks, it

plunders the stocks of fish as well as the food depots of the trappers. The only way in which the stores can be protected is to lay them on a platform on high posts of which the bark is covered with tin-plating so that the bear's claws cannot fasten into and help him to climb them.

The polar bear or white bear (*Thalarctos maritimus*) is confined to the coast and common in the northern parts. It is occasionally found as far south as the Straits of Belle Isle whither it is carried on ice flows. The rocky caves in the neighbourhood of Cape Chidley are reported to be infested with these creatures. They are, as already indicated, the far-travelling animals of the coast; when the ice breaks up they float down to the south on an iceberg hunting seal, but when the ice begins to disappear they swim to the shore and begin their journey back to the north on land. Sometimes it loses its way in the long narrow fjords. Some years ago a pair of them stayed at Double Mer living on seal and salmon till they were shot in the autumn. During the winter of 1894 the tracks of three white bears were seen close to North West River; a few exemplars have been killed in that locality (588 a).

The wolf (*Canis lycaon*), the swiftest quadruped of the wilderness, belongs pre-eminently to the tundra where the wild reindeer — the caribou — are still plentiful. The wolves follow the caribou herds but are rarely visible even by day, their colour protection being great. In a way the wolf lives as a parasite on the reindeer; it hunts it by fixing its teeth in the thigh or throat of the terrified animal and holding on until its prey falls from loss of blood and terror. In the forested lands the wolf is seldom found since the caribou almost died out there. Its lonely cry in its inexpressible sadness is the peculiar melody of the arctic tundra, and pierces to the marrow of one's bones; the howl of the wolf is the saddest sound in nature and is prolonged and mournful as the creature cries its hunger to the stars.

— The white or Arctic wolf (*Carnis tundrarum*) is occasionally caught in the barren grounds; it does not appear to enter the timbered region at all. —

The wolverine or carcajou (*Gulo luscus*) is the most cunning creature of the peninsula and the greatest killer of the wild reindeer; it kills for love of killing, and in so doing makes the carcase so dirty that neither man nor other animal can use it even for eating. To its ferocity and cunning is added great bodily strength, enabling it to accomplish awful destruction. The trapper calls the wolverine the forest's worst thief, for it follows the line of traps and plunders them. The desire to accumulate property seems deeply implanted in this animal. It completely guts unguarded lodges; its tracks clearly show who has been the thief. The Indian considers the wolverine to

embody all the cunning and mischief that can be contained within the skin of a beast; when it is captured he will inflict upon it every form of torture of which his mind is capable. A wandering, mad and furious wolverine is a dangerous beast of prey.

Arctic fauna was found much further south in earlier days than at present. The walrus was not rare in the Gulf of St. Lawrence (HAKLUYT). The polar bear was common in Labrador; CARTWRIGHT (134) in July 1778 counted 32 white and 3 black bears at Eagle Run. JACQUES CARTIER found a polar bear between Newfoundland and Funk Island. CABOT and CORTEREAL met white bears in a place which can be presumed to have been Newfoundland. Yet the limit of the polar bear's area is moving further and further to the north: even in the last century a polar bear came to Maine; about 1850 the last polar bear is said to have been shot at Eskimo River, in 1862 on Tub Island, and in 1864 at Domino Harbour (PACKARD).

The l y n x or m o u n t a i n c a t (*Lynx canadensis*) is found in the southern parts of the peninsula in the broken country. It generally lies in wait beside the tracks of the hare; if it does not catch hare it is in a bad way. The Indians say that in those years when disease or migration has emptied the district of hare the lynx bears no young, but when the hares again become plentiful cubs reappear. The lynx is passionately fond of perfume, its chief delight being that of castoreum; so the trappers frequently use this to capture it (434).

Ever since the 16th century the *coureurs des bois* and the trappers have earned their living by hunting fur-bearing animals. From the point of view of the population, especially in the interior, the most important animal, however, is the c a r i b o u, merely a New World form of the reindeer, and it still forms an important source of subsistence for most of the inhabitants, while its skins are absolutely necessary to protect them from the severity of the winter.

It is said that there are two kinds or races of reindeer in Labrador: the w o o d l a n d c a r i b o u (*Rangifer caribou*) and the b a r r e n-g r o u n d c a r i b o u (*Rangifer arcticus*); these would probably correspond to the supposed wood- and mountain-reindeer in Fennoskandia. According to CARTWRIGHT (134) both kinds of caribou existed on the Atlantic coast of Labrador in his time. It seems undeniable that there is a woodland caribou, but whether it is a distinct race or a type due to the effect of environment, conditions of food and climate seems to me not yet decided, PRICHARD remarked, who studied the question in Labrador (761). This kind is larger than the other and

is said to have lived scattered about the timbered country of the Atlantic watercourses, whereas the barren-ground caribou prefers the northern tundra but is also found in certain mountainous tracts in the forest region, e.g. the the Mealy Mts. It must be left to the zoologists to decide whether such a distinction can be better maintained between the two races in Labrador than in Fennoscandia.

Between 1850 and 1870 the woodland caribou is said to have been plentiful all through the forest region. Every third or fourth year it used to migrate to a distant part of the country, revisiting its former pasture-grounds after a similar lapse of time. In April when the snow began to get soft they moved towards the places where they intended to breed and to pass the summer; they always travelled at night, feeding oı resting during the day. However as early as 1896 Low found that they had been practically exterminated by rifle and wolf on the southern watershed, being found only in small numbers at the heads of the rivers flowing into the eastern part of the Gulf of St. Lawrence; yet in the Hamilton River basin this species was still found in small bands. At present it is probably completely exterminated in Newfoundland-Labrador, and this fact has caused the Indians living in the inland forests much distress, for they largely depended on this animal both for food and clothing; it is said that in consequence many of them have been compelled to abandon those districts or have died out (cf. the Naskaupee Indians).

Bell thinks that the caribou were exterminated all through the southern watershed of the peninsula chiefly through the improvidence of the Indians. Any kind of reindeer is now considered as comparatively rare within the forest districts; only in some isolated cases have I found tracks of them in the lichen carpets of the forest. During my extensive flights I have only been able to find a tangle of caribou paths between the line from Petitsikapau Lake to Mishikamats Lake in the south and the George River's sources in the north; this must be a famous deer pass; the ground is trampled like a barnyard in wide paths going to the east (cf. 995). It was almost impossible that such a network of reindeer paths should have escaped observation anywhere else in the generally heavily-lichened forest area if they had existed.

The herds of barren-ground caribou were once enormous. They took three whole days to pass through the Koksoak River and the missionary Lenz told Prichard that when the herd came out opposite Davis Inlet they took three whole days to pass in a solid mass. Such herds are gone for ever; the state of the caribou moss shows that there are no big herds in our day.

It is a fact that the herds are decreasing at an alarming rate. What is the cause? The caribou has three enemies to fear stated Prichard: the Indian,

the Eskimo and the wolf. The last is the worst; year in, year out the wolves still hang on the flanks of the migrating beast and do most harm at calving time, when they kill the does and fawns. I do not think that the decrease in the herds can be attributed to the annual slaughtering by the Indians, PRICHARD continues; it may be that for reasons at present unknown they have migrated far from Labrador. In earlier days it used to be said: no man knows whence they come or whither they go.

There are many hypotheses concerning the migrations of the caribou. BELL reported in the 1880's (56), that they appeared to migrate annually in a wide circle. Starting late in summer for the west coast, they followed the edge of the forest eastward, crossed the Ungava River in September and October, and on reaching the Atlantic coast turned southward and then westward, through the woods to reach their original starting-place in the winter. Others cross and recross the Ungava River in March.

Further it has generally been said that the annual migrations of this animal have followed unchangingly the same tracks from prehistoric times; this is, however, not at all the case. During her expedition in 1906, on the 8th August, Mrs HUBBARD came upon the main migration moving east at the north end of Lake Mishikamats. Towards the end of August 1907 CABOT found the caribou in large numbers along the Height of Land inland from Davis Inlet; the Indians he met had killed nearly a thousand. In 1910 PRICHARD found that the migration must have reached the George River in June and early July. Taking into consideration the facts he knew he came to the conclusion that in the main 'the deer's will is the wind's will', but that in autumn they are impelled by the 'migratory instinct' to seek the timber and the neighbourhood of the coast, and *vice versa,* in the spring and summer to return to the rocky mountain where the grasses grow in order to avoid the flies. Yet, it happens that the actual line of migration is not the same in two consecutive years, and often not even approximately so, and consequently their routes can never be certainly forecast or calculated. It is often difficult to imagine the reasons that govern their perplexing choice unless the diversion of the wind or forest fires are the explanation. The most north-westerly, almost unknown part of Labrador — the peninsula between Hudson's Bay and Ungava Bay — about 120,000 sq. miles in area — might have been expected to provide a summer home for the herds of countless thousands who once ranged throughout the interior. But FLAHERTY, on the basis of his investigations, concluded that they had shifted their migration southward and eastward to the valley of the Koksoak River and the area south of the Ungava Bay: so say the natives. On his extensive journeys in these parts FLAHERTY saw only five caribou, and concluded that

this peninsula had been deserted by both them and man. All the descriptions given by missionaries and even by the coloured people in Newfoundland-Labrador also confirm the notion that there have been repeated changes in the migratory paths. When the caribou start on a new route the people suffer hunger and starve. A single caribou, like the herds, wanders thus against the wind and comes perhaps to new places when the wind changes. This is well known to the local population. One spring caribou may be killed near Hopedale while the Nain hunters fail to sight a single animal. The next season Nain may be full of deer and Hopedale men go hungry. At the end of the 19th century, between the 5th and 18th of November, the deer used to appear regularly in Jack Lane's Bay, but since 1903 they have not been seen there (761). We shall later return to the subject.

The raven and the wolf announce the arrival of the migrating herd and soon it begins to live in the woods, wandering slowly from place to place. This special biological scene, which can still be witnessed in the great lake districts of Canada when the wild reindeer migrates, is certainly past in Labrador. At the present day the wanderings of the caribou on the tundra, organized with almost military routine, are on a comparatively modest scale if they still exist at all.

— When organising expeditions it is obviously unsafe to trust to meeting the caribou, it is so much a matter of chance; one may however with fairness expect to supplement provisions in summer with some fish and small game. —

The m o o s e (*Alces americana*), which is of such capital importance to the Canadian Indians, is not found here, and none of the old literary sources mention its existence. It is very doubtful, Low states, whether this species enters the south-west limits of Labrador from the head waters of the Ottawa valley where it abounds. The moose has been found as far south in the St. Lawrence valley as the Bersiamits River, about 230 miles below Quebec (435). This animal was also very common in the country drained by the St. John River, stated Father Le Jeune in 1634 (497).

— It has been considered that the destruction of the elk was one of the reasons why the Montagnais left the neighbourhood of Lake St. John and the Saguenay. —

Nor is there evidence that the musk ox (*Ovibos moschatus*) has ever been found in Newfoundland-Labrador.

Between the limits of these two animals the mammal fauna of Labrador may be termed typically boreo-arctic.

The records of the Moravian Missionaries show that herds of great cetaceans earlier lived at the Labrador coast. The whales have since retired steadily before the advent of the white man, and are now found almost only in the north. Yet even at present many different species of these leviathan live off the shore: the sulphur-bottom whale (*Sibbaldus musculus*) of which a monster 95 feet long and estimated at 294,000 lbs in weight has been killed, the finback whale (*Balaenoptera physalus*) up to 65 feet long, the hump-backed whale (*Megaptera nodosa*) up to 70—75 feet long; at Bradore, near the Straits of Belle Isle, the hump-backed whale has frequently been caught 70 feet in length and producing 300 barrels of oil. The white whale (*Delphinapterus leucas*), up to 20 feet long which occurs as »porpoise herds», is still one of the common species, but fewer and fewer white whales are being caught. At the mouth of the Little Whale River the Indians do the greater part of the labour of driving, killing, flaying and preserving the white whale, Turner (174) reported. The skin is tanned and converted into leather nearly waterproof. The Greenland whale (*Balaena mysticetus*) occurs rarely and the sperm whale (*Physeter catodon*) is seldom killed in these days. The fierce pirate of the coast, the killer whale (*Orcinus orca*) hunts the bigger whales. The grampus (*Grampus griceus*) up to 10 feet long rolls its huge body in the fiords, and sporting porpoise (*Phocaena phocaena*), 8—10 feet long and good for eating, are fairly common near the shores. The narwhale (*Monodon monoceros*) is only to be found in the north; about 1860 it was observed near the middle of the coast.

The whales apparently come from the north and are caught some distance from the coast, but their number is not overwhelmimg and is decreasing. The whale factories at Anse au Loup and Cape Charles have been closed for lack of the animal. The factory at Hawkes Harbour runs periodically on the most modern Norwegian methods.

For the natives in Labrador the next most important game are the phocids, and the sea is still well stocked with seals. These 'marine wolves' are not only the mainstay of the aboriginal coast-dwellers, they have also industrial significance. Off the shores of Labrador, especially in the south-east, the hunting in spring of species of this family is still probably more extensive than anywhere else on the face of the globe.

The big harp seal (*Phoca groenlandica*), in the Eskimo language *hirolik* or *atak*, is far the most abundant in Labrador. The next most important is the small bay seal or harbour seal (*Phoca vitulina*), the Eskimo's *kasigiak*, it lives apart and is to be met with in the same places at all seasons.

Of all seals this one is the most adaptable to different environments. In the estuaries it wages deadly war on the salmon and can force its way up very formidable rapids to hunt this fish. HIND found them sporting in the Moisie River among the trout and salmon as they leap up the steps of the last falls on their way to the spawning grounds higher up the river. Below the Grand Portage of the Moisie River he found a small herd of seals. LOW reports having seen it in two or three large inland lakes near the head of the Stillwater Branch of the Koksoak River, and Mrs HUBBARD found them playing in Seal Lake and above Seal Rapid in the Naskaupee River, the distance from the salt water being at least 100 miles and far above the late-Glacial marine limit. PRICHARD found harbour seals fifteen miles up the Fraser River; they had evidently already had some experience of the Eskimo and, diving under the canoe, disappeared down stream. The salmon fisher considers the bay seal the 'thief of the river', they watch the nets. The young are called r a n g e r s and have beautiful coats for a year.

The r i n g e d s e a l (*Phoca hispida*) the *netsek*, is most important for the Eskimo; it is an arctic animal, whelping in holes dug below the snow at the breathing hole. The netsek never comes to the southern parts of the peninsula. The g r a y s e a l (*Halichaerus grypus*) is the largest of the Labrador seals, ten to eleven feet long. The h o o d (*Cystophora cristata*), the Eskimo's *netsivuk*, comes much to the shore, in spite of the fact that it is a pelagic and glacial seal. Harp and hood live in herds and are migratory.

Of the b e a r d e d s e a l (*Erignathus barbatus*) only a few exemplars are to be found.

The increasingly vigorous prosecution of the seal fishery from Newfoundland has already begun to affect the numbers, especially of the most valuable: the harp (364). Every year the white communities in Labrador are finding seal-fishery less worth while, and many Eskimo settlements have disappeared, as a fisher has been deprived of his once plentiful game. Fortunately the Eskimo's favourite seal, the netsek, does not come south at all, but whelps in holes excavated by it in great ice pans.

The apathetic w a l r u s (*Odobenus rosmarus*) is now to be found north of Okkak. Earlier it was found all the way down to Nova Scotia and to Saguenay in the Gulf of St. Lawrence (435). Exemplars were killed at St. Augustine in 1840, at Square Island in 1855, at St. Lewis Sound in 1881 (716), and at Cape Mekantina in the Gulf in 1908. The walrus is evidently also one of the animals being killed off by man more quickly than it breeds.

Of domestic animals only the Eskimo dog, the husky-dog, can be said to have been a denizen, an absolutely indispensable support to the Eskimo's winter hunting. In some inhabited parts of the southernmost strip of the country horned-cattle are bred, chiefly cows. Rats sometimes come to the country with ships.

Birds.

Newfoundland-Labrador with its considerable extension from south to north and the conditions offered by that varied interior must favour the development of a bird life comprising a great number of species.

On the boulder strewn inland of the farthest north thrive the Lapland longspur (*Calcarius lapponicus*)[1], the wheatear (*Saxicola oenanthe leucorhoa*), the snow-bunting (*Plectrophenax nivalis*), the snowy owl (*Nyctea nyctea*), the rock ptarmigan (*Lagopus rupestris*), and the gyrfalcon (*Falco rusticolus*). Here the splendid American rough-legged hawk (*Archibuteo lagopus sancti johannis*) is also to be found.

All along the coastal tundra some small characteristic arctic species, the American pipit (*Anthus spinoletta*) and the horned lark (*Otocoris alpestris*) will cheer the wanderer with their song. Here we also meet the savanna sparrow (*Passerculus sandwichensis labradorius*).

On the outer rocky islands the puffin (*Fratercula arctica*), black guillemont (*Cepphus grylle*), murres (*Uria aalge* and *lomvia*), tinker (*Alca torda*), different gulls (*Larus*), terns (*Sterna*) and cormoran (*Phalacrocorax carbo*) live, and some visiting gannets (*Morus bassana*) or petrels (*Oceanodroma*), and perhaps a jaeger (*Stercorarius* sp.) may also be seen robbing the gulls and puffins of their prey. The eider (*Somateria mollissima* subsp, *borealis* and *dresseri*) seem to prefer the outer parts of the fiords. The king eider (*Somateria spectabilis*) is a wonderfully marked bird. Yet all these species seem to breed surprisingly scarcely on the coast, maybe they were formerly more abundant. They have surely had to pay a heavy tribute to the polar bear and the »egging» and shooting residents and their husky-dogs.

The more closed bays in the wooded land seem to have remained nurseries for other water birds. In the Back Bay of Lake Melville I might have believed it was the sea serpent I saw, when a flock of some thirty thousand blackducks (*Anas rubripes*) and other *ducks* flew in a long row, sinking and rising close over the waves.

[1] The nomenclature is that used in Chapman, Frank M., Birds of Eastern North America. Second edition (XXXVII + 581 p.) (1934).

In the region with tree growth occur different ptarmigan species: the willow ptarmigan (*Lagopus lagopus*), the rock ptarmigan (*L. rupestris*) and the spruce grouse or spruce partridge (*Canachites canadensis*) and Reinhardt's ptarmigan (*L. rupestris Reinhardi*). The ptarmigans are the most abundant of all the larger birds of the region, and therefore an important article of food. When the snow in the farther inland is covered by a strong ice crust and the birds cannot get down to their food the flocks of ptarmigans may be very numerous near the settlements in the bays.

With the exception of the ptarmigan game land-birds are not plentiful, nor are the aquatic birds in the interior, and the fact is considered due to the scarcity of their food. The water birds are conspicuously scarce also in the far north (Turner).

The harlequin duck (*Historionicus historionicus*), the white fronted goose (*Anser albifrons*) and the Canada goose (*Branta canadensis*) and gulls are perhaps the principal water birds of the forest area. The geese are easily caught by the hunter's dog during the moulting time when the wing feathers are not long enough to bear them. When they emigrate in the autumn the geese gather in flocks of 600—800.

In the forested regions there is an abundance of different small species: robins, thrushes, warblers, shrikes, swallows, sparrows, redpolls, crossbills, flycatchers, woodpeckers, owls, and hawks. The black, solitary raven (*Corvus corax principalis*) is a common permanent resident. The croak of the raven, the cry of the loon and the dismal howl of the wolf are certainly the three characteristic sounds of the interior of Labrador (761). One of the most amusing of Labrador's animals is the extremely curious Labrador jay (*Perisorcus canadensis nigricapillus*) resembling in all its behaviour and especially its pilfering habits his cousin in Lapland the *Cractes infaustus*. This »whisky-Jack» or »whisky-Johnnie», the Indians *ouicheat-chan*, is often the only feathered creature one can discover in the thick forest. It joins with shrill cries the wanderer and follows him to the camp. There it jumps freely and easily between dogs and people looking for the remnants of meals and sits down, the head inclined, some meters from where one eats, sometimes impudently even in the very door of the tent, waiting for some contributions. This 'Canadian jay' is supposed by the natives to have something of the evil spirit in it, it is said to inform the various animals of the approach of Indians. Therefore they rarely fail to kill the jay wherever found. The Whisky-Jack was never permitted to enter the Indian lodge, writes Le Jeune (497) in 1633. But

the gizzard of this bird was formerly examined with the greatest care to see if it contained any fragments resembling the bones of a large animal, believing that if such were discovered they would soon kill one of the same kind.

Following the journals kept at the Hudson's Bay Company's Winnikapau post geese and summer birds arrived on or about May 10th in the interior of Labrador (58). Thereafter the forest will be enlivened by the singing birds. The divine song of the hermit thrush (*Hylocichla guttata*) and the cry of the loon's (*Colymbus* sp.) protracted, melancholy hallooing is the real, inspiring sound in the wilds of Labrador.

In Labrador have been found some 225 species of birds, but of them only ten per cent are permanent residents, as for instance: the spruce grouse, the ptarmigans, the rare golden eagle (*Aquila chrysaëtos*), the white gyrfalcon (*Falco islandicus*), the snow owl, the Labrador horned owl, the hawk owl, the raven, the Labrador jay, the snowbunting and the Hudsonian chickadee (*Parus hudsonicus*). In winter time therefore quite absolute silence prevails in the forests.

The inhabitants of Labrador are few (p. 439) yet the rapacity of the human beast has already succeeded in spoiling the animal stock very much. During the last hundred years two species have become extinct: the flightless great auk (*Plautus impennis*) in 1852 and the Labrador duck (*Camptorhynchus labradorius*) in 1874. Protection of animal life is absolutely necessary (327, 952, 1052-1052 b). The *Migratory Birds Convention Act* (1933) now gives a formidable list of birds which may not be killed, captured, injured, molested, sold, nor their nests or eggs injured, destroyed, or molested. The penalty for the infraction of this act is a fine of not more than 300 and not less than 10 dollars or imprisonment for a term not exceeding six months, or both fine and imprisonment. This is severe but necessary, and it is to be hoped that the act will for some time be administered with the outmost rigour. The population so often faced by a great scarcity of fresh meat regard the institution of bird sanctuaries as unjust legislation (510).

The bird fauna contain two intermixed elements: the Canadian element in the wooded southern part and the Hudsonian element in the north. Both these habitats glide imperceptibly into each other. Sheltered valleys enable the Canadian birds to extend into the region of the Hudson provinces, the latter can only occupy the tundra patches in the forest region;

thanks to their wings they can reach the country from all parts. The willow ptarmigan is a Hudsonian representative, but the most characteristic Hudsonian bird is the white-crowned sparrow (*Zonotrichia leucophrys*) the familiar dooryard bird of the bleak Labrador coast, TOWNSEND (955) states. The spruce partridge and the Canada goose on the other hand represent the Canadian province. This matter is exhaustively developed by AUSTIN (23).

The both avifaunas which have been studied in greater detail show the same astonishingly extension in the east of Labrador as the flora: as one approaches the coast the faunal limits no longer runs in the same direction as the parallels of latitude as is normally the case elsewhere on the earth and as is also the case in the interior in the Hudson forests, but they cross the parallels at a great angle and then follow in the main the direction of the Ocean shore to the south in the same way as the limit of the vegetation. In this remarkable fact the special bioclimatic characteristic of Newfoundland-Labrador is more strikingly reflected than in any other geographical phenomenon. It also gives a clear indication of the cause of the anomalous distribution on the Atlantic coast here of both the biological and the climatic types: the influence of the cooled air mass above the icy water of the Labrador Current upon the vegetable and animal life in that neighbourhood. The consequence of this is of course that the subarctic or arctic, xerophilous fauna and flora elements find more favourable conditions on the coastal belts than do the subboreal species of the forest regions; the latter are therefore driven out by the former if they should happen to take root there.

Amphibia and reptilia.

Of *amphibia* frogs or toads are said to have be found up to Cape Webuck on the coast. I am not able to confirm this information, but it seems not to be impossible. HANTSCH mentions (399, 400, 401) from Natsitok at Ungava, at nearly 60° N. lat., tadpoles of some species of frog or toad. PRICHARD mentions that frogs were heard and seen at Stag Bay, Domino Harbour, Lewis Bay, Henley Harbour and on the coast of the Gulf of St. Lawrence.

Reptiles, as for instance snakes, have not been found in Newfoundland-Labrador. In the uppermost part of the Moisie River Valley HIND saw a lizard five inches long; the only reptile of the kind observed in this valley.

Fishes.

Of all the fishes the cod (*Gadus callarias*), the Eskimo's *ogak* (including some other *Gadus* species, principally the haddock (*Gadus, aeglefinus*) is by far the most important, being with some herring the staple inhabitant of the Newfoundland-Labrador seas. It has been said that the codfish is for the economic life of the settlers in the coastal districts what the seals are for the Eskimo's and the caribou for the Indians'. Already more than four centuries ago it was the cod, »*baccalhao*», which induced the people of the Old World to undertake voyages to Newfoundland and Labrador.

The cod comes to the coast every summer, earlier or later. The shoals usually appear first at the south coast and then, when the ice is disappearing, successively farther north all the way up to Cape Chidley. It is the small herring-like salmon fish, the caplin (*Mallotus villosus*) the Eskimo's *angmagassart* or *kolleligak*, which seems to be the decisive factor for the arrival of the cod. This small fish goes every year in enormous shoals inshore in order to spawn, and being the most selected food of the cod it is followed by the cod shoals. Also the caplin itself gives rise to fishing in the fiords; it is caught in nets, boiled and eaten or dried, and as dried kept as reserve for people and dogs in winter time.

The cod-fishing begins as soon as the ice floes disappear, as a rule about the 15th of June in the very southern part of the coast, and thereupon advances northward. To my mind the fishing begins too early, the first arrived cod being too small and too lean, at least on the Atlantic coast. In the end of July (for instance in the Nain archipelago) the cod on the other hand begins to be comparable with the fish caught in Fennoscandia, the flesh is now savoury and the liver rich in oil. The reasons for the early beginning of the fishing in Labrador are evidently many; in the south the sharks arrive in July and do much harm both to the cod traps and to the nets. The principal urge is naturally the desire to get a big catch and to get it dressed when the weather is good. At the end of the summer the cod shoals successively move to deeper water and the catch is more difficult. There are also years when the cod occurs only in a few places, and for a short period. The fluctuations are believed to depend on the behaviour of the caplins (199, 364).

Among the species of shark found all along the coast are the 8—10 m long ekalluvak (*Cetorrhinus maximus*) and the smaller Greenland shark (*Somniosus microcephalus*. The shark is not used by the people, even as dogs' food.

The halibut (*Hippoglossus vulgaris*) is to be found only in deep water

far from the shore. The coastal water is perhaps too cold. A f l o u n d e r is the only noteworthy representative of the flat fish family (364).

Big shoals of exceedingly fat h e r r i n g (*Clupeus harengus*) occur along the south-eastern shores in August and September.

The common s a l m o n (*Salmo salar*), the Eskimo's *kavisilik*, is found all along the coast, in the fiords and the larger streams of the St. Lawrence and the Atlantic coast, and also in the rivers emptying into Ungava Bay. The salmon enters the rivers of the Gulf early in June. It arrives in the southern parts of the Atlantic coast about the 20th of June, when the catch can begin. The fishing continues till about the 20th of July when the fish ascend the rivers in order to reach their spawning grounds. This industry is important at present only in the southern part of the coast up to Hopedale. It is said that the salmon was formerly found in considerable quantities also north of Hopedale, but now it is so scarce there that it is not worth catching. It is therefore rather surprising that another salmon district lies farther north in Ungava Bay, where salmon-fishing begins near the mouths of George River, Whale River and Koksoak River about the 1st of September; the fish does not ascend the Koksoak and other rivers of Ungava Bay until about the end of August. It thus seems to take two months for the fish to pass from the Straits of Belle Isle to Ungava; but there is some evidence to show that the Ungava fish follow the coast. Low (588 a) thinks there may be some connection between the arrival of the salmon and the temperature of the coastal water, for it does not occur in Hudson Bay, the water there being too cold. In 1937 some 1,250,000 lbs of salmon were taken in Newfoundland-Labrador.

The *ouinaniche*, which is found all over the south-eastern quarter of the country and in both branches of the Hamilton River above the 102 m high Grand Falls and in Mishikamau Lake, is considered a landlocked variety of the *Salmo salar*. The average is not above three pounds: the largest in the Hamilton River do not exceed ten pounds.

In the interior of the country in basins drained to the Atlantic the principal fish is l a k e-t r o u t, *namacush* (*Salvelinus namacush*). This huge fish is found in the highest lakes, at 2000 ft above sea level on the rolling peneplain, occasionally it scales even 40 lbs and more in weight. It is plentiful in all the larger lakes especially Mishikamau Lake. It appears to be the same fish as *kokomesh* (= »the fish that swallows anything», as the Indians call it) a variety of salmon trout which sometimes grows to 30 or 40 lbs in weight, though the average is said to be 8 lbs. Not so important to the people is s p e c k l e d or b r o o k t r o u t (*Salvelinus fontinalis*) which takes fly in the open stream up to December. One has only to drop a troll and one can land a dozen

trout in some minutes. It is very astonishing that on the Hamilton River below the Grand Falls the trout does not average 1 lb, but above it more than 3 lbs; Fig. 209.

On the Atlantic coast and in Ungava Bay the sea-trout is specially plentiful and large, averaging 3—4 lbs; the mouths of the northern rivers swarm with big trout during the autumn; southward the sea-trout becomes smaller. This fish may be a sea-run variety of the *Salvelinus fontinalis*, if not an individual species. Fishing for sea-trout replaces along the Atlantic coast salmon-fishing north of Hopedale. It spends the winter in the inland lakes and does not come down to the sea before the freshet has gone in the rivers at the beginning of July or even in August. At the beginning of September it is running upstream again in great numbers. This fish is netted in the bays into which a mere trickle of water runs, as well as in the mouths of the rivers. — Travelling along these streams a trout net should not be forgotten among one's equipment.

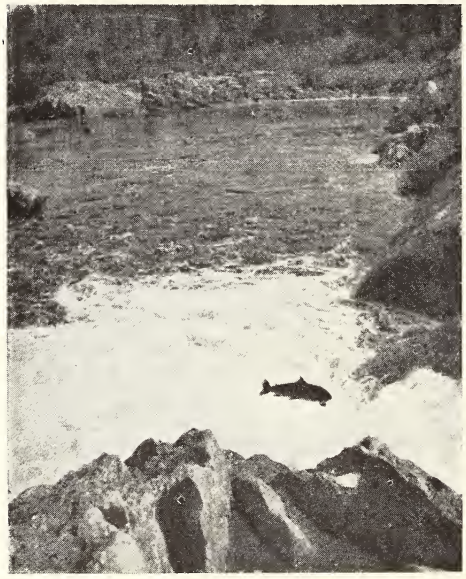


Fig. 209. Trout leaping in Mary's River. Photo I. HUSTICH, 1937.

The charr (*Salmo alpinus*) is a lake fish which is said to be caught in the sea also.

The whitefish (*Coregonus clupeiformis*) is of more importance than any of the trout varieties; it is found in abundance in lakes and rvers all through the interior, where it is caught with the gill net; its average weight is 3—4 lbs.

The list of fish also includes the suckers: the long-nosed sucker (*Catostomus longirostris*) common in the rivers and lakes of the interior, is the chief food of the Indians in many parts of Labrador; but they prefer the red sucker (*Catostomus forsterianus*) to the grey sucker, the former being common all through the interior: the average weight of both is about 5 lbs. The Hamilton River and its widenings contain specially large numbers of white fish, pickerel and suckers.

In the lower George River the sea-trout and the salmon, and higher up the brook trout, ouinanishe and namacush are caught.

The American smelt (*Osmerus mordax*) is common at the mouth of the North West River were it is caught abundantly in November and early December.

The pike (*Esox lucius*) abounds in the lakes and quiet flowing streams all through the interior; it varies in weight from 2—15 lbs.

In the small clear lakes far away in the north of the Ungava peninsula a poor kind of trout (*Salvelinus fontinalis*) manages to exist, it is the Eskimoes' *ekalluk*. In the watercourses two other small fish live, called by the Eskimo *anaklek* and *adeluk*. Organic life is very scarce in the cold clear water.

Insects.

The brief and delicious summer in these parts is rendered terrible by insects of many kinds. The scourge of the sub-arctic lands is the Grey Plague (761): the mosquito, the blackfly, the bot fly and others in countless swarms which harass the traveller by day and night. When there is no wind the usual pillar of mosquitoes revolves and towers around and above every man's head. These loathsome insects prevent any feeling of relaxation and are the dread of a sleepless night. Not until the end of August are the mosquitoes and black-flies less numerous and no longer a nuisance in Labrador. The swamp is the home of these 'devil's angels'; when there is a pleasant warmth in the air this winged pest is at its worst. The supply is unlimited, they are everywhere, however many you may kill there are always plenty. One never becomes bite-proof. It is therefore wise to wear veils against the black flies or to smear the face and neck with eucalyptus oil, or else the uncovered parts of the body soon become bloody and sore. One must also have a mosquito-proof tent as a protection against this chief drawback of the country, then one can sleep peacefully to the lullaby of the mosquito orchestra and rise with the sun reinvigorated.

As regards the *invertebrates* the reader is recommended to consult the systematic lists of the fauna of Labrador in the special works mentioned below.

More or less general accounts on the faunistic conditions of Labrador are given especially by Bell (56), Cartwright (134), Chitty & Elson (149), Delabarre (218), Eidmann (240), Grenfell (364), Long (586), Low (588 a), Packard (697, 699, 708, 716), Regan (785), Richardson (797 a), Stearns (882) and Turner (964).

More specializised are the following reports:

for mammals: Anderson (9), Bangs (37, 38, 39), Low (588 a), Spencer (880) and Strong (905);

for b i r d s: Audubon (20 a, 21) Austin (23, 23 a), Bailey (31), Bent (60), Biegelow (65), Brewster (98), Henry Bryant (104 a), Chapman (143), Cooke (176), Coues (184), Dean (217), Eifrig (241), Frazer (285), Gross (385), Hantsch (399, 400, 401), Jacob (483), Lewis (570, 571), Low (588 b), Lucas (595), Macoun (620), Norton (685), Nuttall (686, 958), Stearns (885), Ch. W. Townsend (955), Townsend & Allen (956, 957), Turner (962) and Williams (1031);

for f i s h e s: Kendall (512, 513), Low (588 c) and Storer (898 b), (857);

for i n s e c t s: Fletcher (267, 267 a), Johnson (500), Mc Dunnough (600), Packard (701, 702, 714, 716), Scudder (838, 839), Sherman Jr. (851 a) and Thorell (940);

for c r u s t a c a e a: Rathburn (782, 783);

for m o l l u s c s and e c h i n o d e r m s: Balch (33), Busch (114), Johnson (501); and

for p l a n k t o n: Crowshay (190).

* * *

A retrospect of the natural character of Labrador

will demonstrate that in reality the ordinary vindicated geographical homology between Labrador and Fennoscandia is confined to the scope of the geology and the geomorphology only. On the other hand great dissimilarities appear between all the other physiogeographical characters. In conclusion it is to be noted that the circumstances under which the life in its different forms has to develop are essentially different in these two regions. With this in mind we shall consider the activities and the social life of the aborigines and the settlers of Labrador.

Part VI. Human life.

Some general considerations.

The geographical distribution of the population.

It has been said that Labrador is a little world of its own, and there is some good reason for this idea.

According to the official census this little world comprised a population of 4716 in 1935 (222). The figure however is somewhat misleading, for during at least nine months of the year, Indian hunting nomads, the so-called *Canadian Indians* (p. 609), to the number of some 280 are at work in the southern parts of the forested areas. If this number is added to the population figure for the whole of Newfoundland-Labrador the density is 0.01 persons per 1 km^2. These figures are of course fictitious for it would never occur to anyone to settle down for instance in the Torngak Mountains. The inhabited area is mainly restricted to the more or less forested district and the total population figure distributed over these parts indicates an area of 46 km^2 for each individual; but even this figure lacks reality, for a considerable number of the people live outside the forested area.

In Fig. 210 is given the approximate geographical extension of the population mentioned in the statistical reports; a dot indicates five Eskimoes or whites, a cross indicates five Indians. As it is so difficult to localise the Indians and the Eskimoes the map must be regarded as merely schematic as regards the northern parts. The permanent habitations are always at the seashore and no dwellings have been set up out of sight of the high-tide boundary. More than half of the population are found to the south of lat. 54°; cf. the notes on the map.

The endemic groupings.

Still in our day Newfoundland-Labrador is a primeval wilderness. With the exception of the widely scattered camping-grounds of the interior and the few inhabited spots on the coast, there are very few indications that human beings live in the country. For seven or eight months of the year a belt of coastal ice

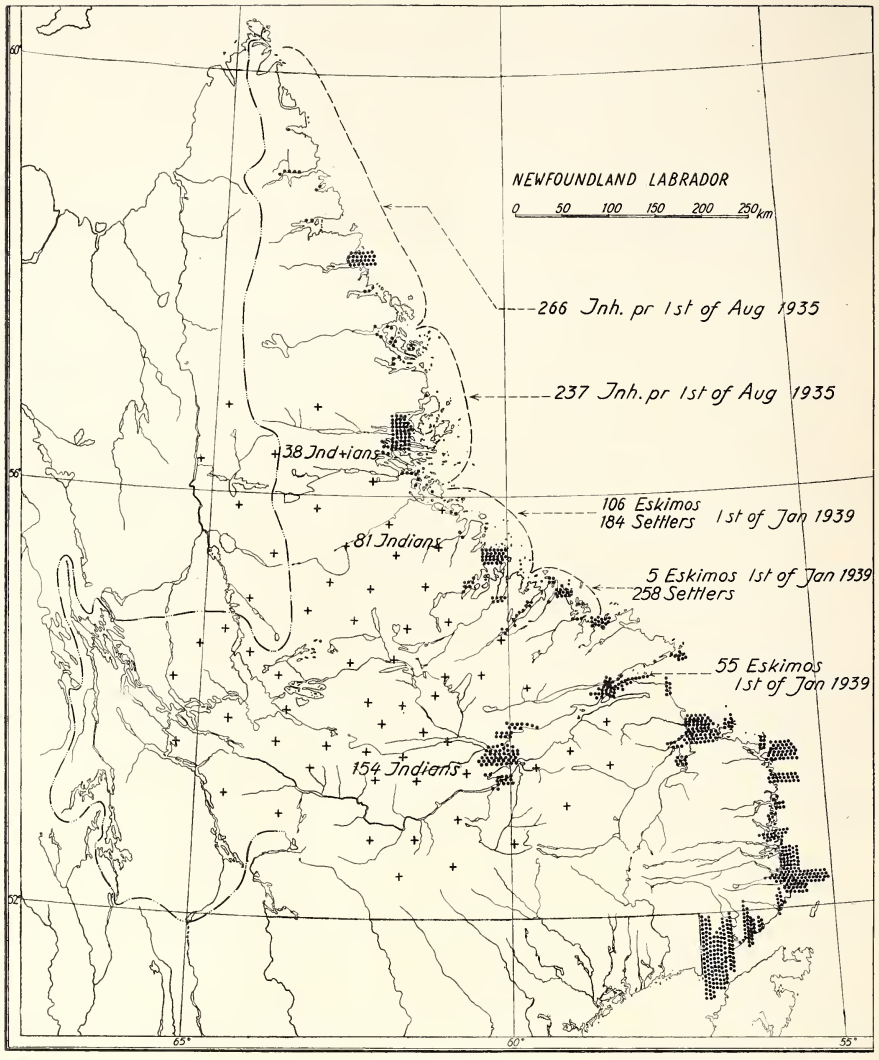


Fig. 210. Schematic sketch indicating the distribution of man in Newfoundland-Labrador according to the census of 1935 (cf. 222). A point indicates five white men or Eskimoes, a cross five Indians.

encloses the deserted land apparently almost completely separating it from the rest of the world. The people in this wilderness must then secure a livelihood from the resources of the country alone. But the land is barren and stingy; the people must strain their utmost even to exist, and this they can do only

if their way of living is in agreement with the resources of the country. But these vary from district to district. Moreover the annual rhythm of nature determines the possibilities of exploiting them. The result of this is that in time different types of population have become segregated, primitive societies all of which bear the marks of endemicity. Inversely these societies clearly show the natural presumptions for their rise and the conditions for their continued existence. They show us how small groups of people can manage to live in the world-wide, subarctic land-outskirts and therefore are of important ethnological interest. They really form a little world in themselves.

The transitional state of the population.

In the isolated milieu the life of these small societies has thus become set in forms determined by nature. For decades and centuries they have lived on the same lines. All fruitful impulses from the outer world have long been intuitively repulsed. The stock has also of late years remained unchanged in the main; the figures rising and falling slightly (141, 163—167, 222, 675 b, 676, 1122):

1857	1869	1874	1884	1891	1901	1911	1921	1935
1650	2150	2416	4211	4106	3947	3949	3774	4716

However, chiefly during the last hundred years stimulating impulses have found their way even to the most distant and most repulsive societies of the wilderness and contaminated them. The old societies in the country under consideration began to ferment and soon the traditional inhibitions to development were broken down one after the other; the development of the people entered upon new and unknown ways and it is still difficult to say whither they will lead if the people are left to themselves: deterioration? improvement? Labrador's people now stand at the cross-roads of good and evil.

It can be expected that the different groups will react differently to the new impulses because of the somewhat differently composed psychological structure and attitude to the tasks of life of the individuals. A considerable difference in this respect can be noticed between the three main ethnic groups of the population: the Eskimoes, the Indians and the White People. For this reason we will now consider these three elements separately. For historical reasons it is justifiable to study first the aboriginal inhabitants.

The aborigines.

The culture of primitive man is always rooted in natural conditions, and this is unusually clear in Labrador. We have for this purpose only to glance at the distribution of the ethnic groupings in the area under consideration in relation to the varying environments.

Farthest north lies a greatly cut up track of high mountains (cf. p. 330). From this mountain tundra area a small strip of forestless coastal tundra stretches southward along the coast towards Pinware Bay on the northern shore of the Straits of Belle Isle. Looked at from the sea this coastal tundra gives the peninsula such a poor appearance that one of the first men to sail these waters, the Frenchman JACQUES CARTIER in 1534, gave Labrador the opprobrious designation: 'the land that God gave to Cain'. With that was born the misleading conception — so difficult to eliminate — of the extreme barrenness of the whole of Labrador. The two tundra types occupy larger and larger areas of the country towards the north so that finally farthest away, beyond Ungava Bay, the forest only forms small strips on the valley bottoms of the great rivers and patches here and there in sheltered hollows.

Within the coastal tundra runs the endless taiga with its in parts nearly impenetrable, primeval woods of black spruce, its lakes, marshes, and heights with small bare summits. Cf. Fig. 156.

The two different habitats of Eskimoes and Indians.

The Eskimoes occupy their natural home in the bleak and rockbound coastal tundra and the neighbouring strips of wood, in the islands, the fiords, and the ocean shores with their thundering surf, their drift-ice and icebergs in the summer, and their fringe of ice where the seals sport in winter. From time immemorial the slanting-eyed 'huskies' have sat there in their igloos and gorged themselves upon seal flesh; see Fig. 211.

The Indians again harbour in the endless, soughing forest lands with their glittering labyrinths of lakes and network of rivers, their dim toned mountains and hills, the mirelands and the scattered patches of 'land without trees' as the tundra is called by the aborigines. In the great forests and on the bare crests in the woods the sharp-eyed Indian hunter is on the look-out for game; see Fig. 212.

The feud between Eskimoes and Indians.

It must not however be thought that the natural limits have been in any way respected as a fixed separation between the spheres of interests of the two races. The Indians have a tradition that when *Tcè mentu*, the Great Spirit, (a conception which the Indians probably incorporated in their spiritual ideas after the arrival of the Catholic Mission), wished to give people a clear sign of what is right in Labrador he created the two different natural areas: the forest and the coastal tundra. He decided then that all the forest land should belong to the Indians, while the Eskimoes should keep out on the barren tundra strips along the coast. But the great spirit of the Eskimoes, *tornarsuk*, did not speak the same language; he told the Eskimoes that they could take what they considered they needed. For this reason it has come about that also in these endless wildernesses the boundaries were regulated in accordance with the interests of the stronger. Every attempt made by the Eskimo to force their way into the Indians' hunting-ground in the taiga was considered a grave violation of a holy commandment which demanded restitution, started feelings of revenge in the Indians which had their natural consequences among members of the other race. This tradition is probably artificial and scarcely older than the last Eskimo invasion (see farther on), but in any case it throws light upon a condition which at first glance is astonishing, that even in these deserted places where mankind is a rarity, racial enmity to the death has prevailed for a long time between the Indian and the Eskimo, an animal, inherent hate, originating from a primitive instinct just as that between the wolf and the lynx in the same country; wherever an Indian met an Eskimo the Great Spirit bade the one kill the other.

The spear many a time decided where the boundary should be, and in the course of time streams of blood have flowed here. When Roger Curtis in 1772—73 travelled along the Atlantic coast he was struck by the irony of the fact that the comparatively few tribes living there should be so set upon exterminating each other (196): they were at perpetual war with each other. Between the Mountaineers and the Esquimaux there subsists an unconquerable aversion; the Esquimaux live always upon the sea-shores, from their dread of the Mountaineers. Conditions corresponded to those of our day in northern Canada where it is said that a redskin does not dare to enter the *huskies'*, i.e. the Eskimo's land. At the beginning of the 19th century the Indians and the Eskimoes south of Hopedale sometimes meet, reports Kohlmeister (532), but as the Hopedale Eskimo seek to cultivate their friendship, quarrels and bloodshed never occur. In Ungava, on the other hand, though they often exchange tokens of friendship they were apt to give way to their natural jealousies, and provocations being aggravated their meetings terminated in murder. The

Eskimoes were much afraid of the Indians, who are a more nimble and active race. When Hudson's Bay Company's factory Fort Chimo was set up in 1831 it was considered advisable to surround the post with a defensive palisade to prevent surprise if the clients who met there should begin to fight, as might be expected at any minute seeing that war had so recently ceased and the feelings of hate had not yet died away (963).

Pacification has proceeded very slowly. The open war between the Indians and the Eskimo ceased near the Atlantic coast for a reason which at first



Fig 211. The land of the Eskimoes. Looking over Paul Island in the Nain archipelago. In the background is the open ocean, in the foreground rocky islands are seen with some small patches of black spruce forest, mostly only brushwood, in valleys and sheltered clefts. [Aerophoto the Forbes-Grenfell Expedition, 1931.

seems rather surprising. The practical British traders succeeded in gradually bringing about a kind of peace, at least on the business premises. As fighting was injurious to the commercial interests the managers at the Hudson's Bay Company's posts made the enemies understand that the posts would be withdrawn and the natives lose the advantages the trade gave them if they did not make peace. And this the latter soon grasped, finding it better to

catch fur-bearing animals and exchange their skins for all kinds of useful products than constantly to destroy their possessions and their families by continuing the blood feuds. Further the Indians probably realized that the Eskimo, if necessary, could now depend upon the moral support of the white trappers who had married Eskimo women; this was a handicap for the Indians.

The Moravian Mission also worked hard to create peace and have earned the thanks of many by modifying the racial hate of the Eskimoes for the Indians. The first most remarkable sign of appeasement between the rival parties



Fig. 212. The land of the Indians. Looking south-east over the wilderness of forest on the southern part of the Labrador Lake Plateau. Aerophoto the author, Aug. 2nd 1937.

occurred as far as is known in 1843 when a starving band of Montagnais appeared at Hopedale. Some decades earlier the Eskimoes had completely exterminated them, but now they received them with friendliness, took them into their huts and supplied them with food (325). In 1855—60 the Indians suffered terribly from lack of food. Many parties of them were brought by the Eskimoes to the Mission Stations where they were helped. On an other occasion Indians rescued a group of Eskimoes, who having been unsuccessful in their salmon-fishing, were dying of starvation (325).

However, still in our days certain reflexes from the old fighting period are visible in the distant parts. Flaherty for example says that *Adlit*, the

Indian, even to this day is dreaded by the Eskimo in the country north-west from Ungava Bay. HUTTON tells that Eskimoes still in his day, at the beginning of our century, were scared at the word 'Indian'; when he once travelled southward from Okkak his drivers asked him in awestruck voices: 'Shall we see the Allat (= Indians) (476)?

It should be specially remembered that the white men have also brought a blessing to these primitive peoples, for it was their common sense which stopped the meaningless feuds in Labrador.

At the present time the Eskimoes and the Indians live side by side in perfect peace. There is, however, no attraction between the both races and mostly no open intercourse. The Indians say that they cannot bear the smell of the Eskimo; on the other hand the Indians themselves are so impregnated with the smell of the camping fires that the Eskimoes cannot bear them! Yet, the Indians do sometimes take a steam bath, whereas an Eskimo never in his life time gets rid of his bodily dirt knowingly and willingly. Yet they do not love each other. It is said that they scarcely ever intermarry. The Rev. PAUL HETTASCH, the Moravian missionary, which lived in the country for fourty years told me that he knew of only one mixed marriage, namely the parents of EDWARD RICH whose father was a Naskaupee Indian and his mother an Eskimo; the Riches now form a kind of clan which usually lives apart from the others. On the other hand the aboriginal women are not unwilling to marry the white men.

Their very way of living, their thirst for battle and their dislike of each other show that the aborigenes have had a vague apprehension of their ethnological differences and behaved as civilized people are in the habit of doing in the present period of nationalism. Their somatic characters emphasize the differences.

Anthropometrical characteristics of Eskimoes and Indians

Thanks to different measurements dating back to 1880 and especially to HALLOWELL's pioneer study of 1929 and the measurements secured by W. D. STRONG during the Rawson-MacMillan Subarctic Expedition of Field Museum in 1927—28 among the Eskimo and a small group of Indians living on the north-east coast of Labrador, relatively reliable knowledge of the *living* aborigines is available (cf. especially 86 a, 823 a, 694 a, 152, 230, 231, 752, 897 a, 982, 963, 965, 80a, 906).

Anthropometric characteristics of the Newfoundland-Labrador Aborigines:

	Eskimoes male	Eskimoes female	Indians male	Indians female
Stature:				
	(58) 158.3 [St]	(78) 148.3 [St]	(10) 164.6 [St]	(7) 153.3 [St]
	(11) 157.7 [L, So, P, V]	(10) 149.7 [L, So, P, V]	(41) 166.2 [H]	(29) 154.6 [H]
	(37) 157.0 [D]	(22) 150.5 [D]		
Head Length in mm:				
	(58) 192.17 [St]	(79) 185.04 [St]	(11) 189.4 [St]	(7) 184.1 [St]
	(37) 192.89 [L, So, P, V]	(21) 189.48 [L, So, P, V]	(67) 194.5 [H]	(54) 187.3 [H]
	(11) 191.2 [D]	(10) 190.2 [D]		
Head Breadth mm:				
	(58) 148.31 [St]	(79) 142.26 [St]	(11) 144.1 [St]	(7) 144.0 [St]
	(37) 151.49 [L, So, P, V]	(21) 143.72 [L, So, P, V]	(67) 156.8 [H]	(54) 151.7 [H]
	(11) 147.6 [D]	(10) 141.8 [D]		
Cephalic Index:				
	(58) 77.28 [St]	(79) 76.94 [St]	(11) 76.1 [St]	(7) 78.2 [St]
	(37) 78.61 [L, So, P, V]	(21) 75.88 [L, So, P, V]	(74) 80.60 [H]	(58) 81.10 [H]
	(11) 77.0 [D]	(10) 74.5 [D]	(79) 81.43 [B]	
Cephalo-Facial Index:				
	(58) 95.66 [St]	(79) 93.78 [St]	(11) 98.6 [St]	(7) 93.2 [St]
	(37) 95.77 [L, So, P, V]	(21) 94.35 [L, So, P, V]	(67) 94.0 [H]	(54) 92.50 [H]
	(11) 96.3 [D]	(10) 96.3 [D]		
Nasal Index:				
	(58) 66.98 [St]	(79) 62.54 [St]	(10) 68.9 [St]	(7) 68.6 [St]
	(37) 73.81 [L, So, P, V]	(22) 72.77 [L, So, P, V]	(44) 73.0 [H]	(29) 74.8 [H]
	(10) 64.1 [D]	(4) 62.4 [D]		

Skin Color (v. LUSCHAN scale):

(52)	3—9	30.8 % [St]	(78)	3—9	2.6 % [St]	
	10—13	63.5 % »		10—13	92.3 % »	
	14—17	5.7 % »		14—17	5.1 % »	

Skin Color						
(10)	3—9	0 % [St]	(7)	0	% [St]	
	10—13	50 % »		57.1	% »	
	14—17	50 % »		42.9	% »	
(53)	3—9	11.3 % [H]	(35)	2.8	% [H]	
	10—13	62.3 % »		68.6	% »	
	14—17	26.4 % »		28.6	% »	

The figures in parenthesis indicate the number of measured individuals.

Abreviations: D = Duckworth (230, 231), H = Hallowell (394), L = Lee (see 152), P = Pittard (752), So = Sornberger (897 a), St = Strong (897 a), V = Virchow (982).

In v. Luschan's scale 1—2 signifies light; 3—9 medium, 10—13 dark, 14 and all thereafter still darker.

As these measurements were collected from only a few individuals they are not fully reliable scientifically, for a few large families may easily have a greater influence on the average values than they really should have. Yet the above figures and general experience go to show that the Eskimo are not so tall as the whites and the Indians. The Eskimoes are somewhat more dolicocephalic than the Indians. Both are coloured but the complexion of the Indian is always darker. In general it is not difficult to know at first glance whether one is dealing with an Eskimo, Fig. 213, or an Indian, Fig. 214. Cf. (230, 231, 262 a, 394, 651 a, 694 a, 752, 823 a, 829 a, 849, 897 a—897 c, 910, 982, 1050).



Fig. 213. The Labrador Eskimo type. Photo the author at Hebron, July 1937.

Change of the Eskimo type.

It is an interesting fact that a change must have occurred in the Eskimo type (80 a). The bearers of the old Thule culture (see later on) at Naujan on Repulse Bay had a height of 161—162 cm and a cranial index of 72.5 (262 a), whereas this index at Southampton Island was found to be 74.2; evidently the material from this latter place is too slender either for reliable calculations or for chronological determinations (80 a). The average index of 21 skulls from old graves is put at 71.8, whereas of 12 skulls from more recent graves is 72.6 (978 a). This indicates that the old Eskimoes of the eastern area (including perhaps Labrador) were decidedly dolichocranic.

The cause of the differences between past and present indices is uncertain. Variations often come about with hygienic or economic variations. Stewart (897 a) attributes the change in head shape with a possible decrease in stature to a change in diet. There is a growing body of evidence from other racial groups showing that both these characteristics are rather easily changed when environment, and especially nutrition, is altered. Krogman (1938), who summarized the literature on this subject, says that attention must be paid to a factor or a set of factors that is as difficult to evaluate as it is to describe: the environment, whatever connotation this term may have. The combined effects of disease and under-nourishment may result in a stunting of the presumably 'racial' growth pattern. Here many important problems present themselves.

The psychological characteristics.

Psychological differences are very soon noticed between the two peoples. The Eskimoes have developed far more in this respect than the Indians; their intellect is active, their receptivity great; they are lively, and their behaviour is friendly; at our first meeting I spontaneously called them *the smiling people*, and I still find them so even after the first enchantment has faded; see Fig. 227.

The Indians on the other hand are mostly sullen and sluggish, either reserved or noisy, and impress one as being less accessible and 'stiffer' than the Eskimoes; they are often very reserved towards strangers; the Indian only reluctantly approaches a newcomer, while the Eskimo gladly does so. No scientific research regarding the intelligence stage of the natives of Labrador has been made, as for instance in Alaska (cf. H. Devey Anderson and W. Crosby Eells: Alaskan Natives. Stanford Univ. Press 1935). However, it seemed to me easier to understand many of the characteristics of their mental development if one imagines that the Indian on an average is at the stage of a north European youth at fourteen, the Eskimo at eighteen in the best instances.



Fig. 214. The Labrador Indian type. Photo E. H. Kranck, at North West River, July 1937.

The distinctive race characteristics of the two peoples and the persistent differences in their way of living, their equipment and their language indicate an ethnic differentiation at a very distant period. Where and how this took place is still a mystery, but in any case their common home must be sought outside Labrador.

The origin of the aborigines of Labrador.

Many points about the Eskimo make them unique as a people. They are the only permanent conquerors of the Arctic. The most widely-spread race in the world, they are scattered along some five thousand miles of ice-bound

coast, and everywhere they use practically the same language, have practically the same customs and, until quite recently hunted the same quarry with similar weapons; this they have done from prehistoric times. Their dress, food, dwelling-places, weapons, and habits are the best that could be evolved for their environment. It is evident that long ages were required to develop the peculiarities of their culture and accomodate them to their habitat. No wonder the question of their origin has so long remained a problem; only in the last decades has it been possible to find some keys.

It is not the right place here to go more deeply into these intricate questions, and the extensive literature which has been published on the subject. Yet considering the important interest which the aborigines in Labrador — so to say at the outer edge of the continent's periphery — have for ethnology it may be useful for future explorers here to review shortly some of the conclusions drawn from these people's anthropological indices in conjunction with the remains of their material culture found on the peninsula and the surrounding country. In this way it may be also possible to give the Labrador peoples their place in the scientific framework of today.

On the Origin of the Eskimoes.

Some resemblances have been found between the racial characteristics and the material culture of the late-Palaeolithic reindeer hunters of Central Europe and of the Eskimo (cf. Sollas, Boyd Dawkins, Knud Rasmussen, Birket-Smith). From this the supposition developed at an early date that when the European ice-caps began to withdraw and the inland-ice margin slowly receded towards the north and the wild reindeer followed it, the Magdalenian hunters were compelled to follow their principal game towards the north. In this way they arrived at the coast of the Arctic Ocean and there spread along its shores eastward, finally arriving at Arctic America and Greenland. According to this supposition the Eskimoes are descended from the late Palaeolithic hunters who once lived between the Nordic and Alpine ice-sheets in Europe (cf. 87).

This theory has had to be abandoned; no unbroken connection can be proved in north Eurasia between the Cromagnon race to which these hunters belonged and the Eskimoes. On the Asiatic side of the Bering Strait — e.g. in the territory where the Chukchi live —, conditions do not confirm the assumption that the anthropological relics there must belong to the rearguard of the Eskimo race as supposed by Montandon. They may as well represent a local and temporary expansion of the Eskimo area in America (80 a).

On the other hand, some distant relationship must undoubtedly be recognized between the Eskimoes' material culture and that of the bearer of the so-called *'Arctic stone age'* culture in northern Fennoscandia (915). Both these cultures are distinctly coastal and have similar types of tools and dwellings. I imagine provisionally that they have radiated from an unknown centre which now lies drowned on the shelf north of Asia.

When we speak of the Eskimoes we unconsciously think of three characteristics: race, culture, and language.

Anthropological indications.

On a purely anthropological basis the present day tendency is to see the original home of the Eskimo in America. Close conformity has been found, for instance, between the Eskimoes and the Indians living near Lake Athapasca. It is further undeniable that anthropological similarities are remarkably great between the Eskimoes on the one hand and both the Cree and the Chipewyan Indians on the other (80 a). Now it is uncertain whether both these groups are parts of a great racial unit of the northern woodland Indian people, or a local Indianised Eskimo survival.

This supposition requires for confirmation some correlation between the somatic types in the Eskimo area, but according to BIRKET-SMITH none has yet been confirmed (80 a). Yet, disregarding all slightly deviating details, he found for example that the stature decreases from the Mackenzie 'hyper'-Eskimo type both towards the east and the west. As regards the Eskimo of earlier times, the somewhat scanty skeletal material available leads one to suppose that the Thule Culture Eskimoes at Naujan rather closely resembled the present population at Point Barrow. This fact agrees with the similarity between the ancient Thule Culture and the present culture in northern Alaska. If these similarities can be confirmed it means that on the whole we can point to no essential differences between the bearers of the Thule Culture and the basic Eskimo type.

There is undoubtedly an old Europid long-headed type in America, and its occurrence in the Algonkian stock has special significance when the likeness between the Eskimo and the Cree are considered. The Eskimo race is also thought to have arisen from the interbreeding of a long-headed race and the brachycephalic Mongolid which later immigrated from Aisa. This possibility cannot be dismissed, but it has still to be proved (871, 80a).

Many unknown factors have contributed to make-up the Eskimo tribes and it will be an interesting task for the future to distinguish their various racial types and prove to which one the Labrador Eskimo belong. It may be that such types will reveal something about their tribal migrations, etc. too. Yet there seem to be only slight differences within the eastern groups. I think we must agree with BIRKET-SMITH, that it will be wiser to ignore speculations and merely say that the basic type of the western, central and eastern Eskimo is the same, apart from the changes wrought by the varying amount of admixture with foreign elements.

Cultural indications.

Excellent descriptions of the distinctive material culture of the Labrador Eskimo about the turn of the century in the Ungava district are given by TURNER (963) and for the Atlantic Coast by HAWKES (424). CARTWRIGHT (134) tells of the conditions at the end of the 18th century (cf. the Bibliography). On the other hand little is known of the development of the material culture and the

waves of people who continually brought new cultural additions to Labrador. Few archeologists have done research work in the country and therefore I can only here present some main characteristics.

Recent Eskimo culture seems to have reached the north-east part of the country in almost the fully developed form revealed by the 18th century ruins. Considering that in all the sites investigated European objects are found (70 a), it appears that the Eskimo have not been there more than some 400 years. Although it must be borne in mind that iron may have been furnished by the Norsemen as early as 1000 A.D., or by the inter-tribal trade of drift-objects (800, 391, 387 a, 210).

The recent Eskimo culture.

Now, this recent Labrador culture has one very conspicuous trait. Before it was altered by contact with the civilization of the whites, it had been fairly closely related to that distributed over the central Arctic of America (635, 897 a). More of it seems to have been preserved in Labrador than in the central region proper, (dwellings, snow house, sledge, hunting implements, clothing, lamps, square cooking pots). Some remains (whaling-harpoons, woman's boats, etc.) show that the Labrador Eskimo inherited a good deal more from the Thule culture (see farther on) than their western neighbours. In addition they are coast dwellers and their life is less nomadic than that of the central Eskimo; yet they remain more closely related to the latter than to the Thule culture (635).

The Thule culture.

The original T h u l e c u l t u r e was once spread over the arctic of America, having its centre in the Hudson Bay region and stretching eastward into Greenland. In Labrador it has lasted down to modern times (920) and it appears probable that its bearers were the so-called *Tunnit.* On Southampton Island in Hudson Bay it is known to have survived even as late as 1902 (635). MATHIASSEN has described this culture in detail, showing that it has all the fundamental traits of the recent Eskimo material culture, and some explorers have considered it the original Eskimo culture of the eastern Arctic of America (635).

The Dorset culture.

Remains have also been found of another culture, but this disappeared long ago: the Cape D o r s e t C u l t u r e. JENNESS first discovered and described this culture (489); later it was found in scattered districts throughout the eastern Arctic (490). On the southern coast of Labrador some remains were found by WINTEMBERG in the district of Blanc Sablon-Bradore (1041, 1042, 1044). It may be an early phase of Eskimo culture. On the southern sites it was found that relics of the Thule culture were conspicuously absent and it may therefore be considered quite independent.

Yet in many of the Dorset sites a relationship can be discovered between it and those of the Indians and Eskimoes. JENNESS has pointed out that the Dorset

culture shows unmistakable Indian affinities, particularly with the Beothuks of Newfoundland and the prehistoric 'Red Paint' (490), and MATHIASSEN (640 a) and COLLINS (1937) have suggested that the Dorset group may have been of Indian origin. The correct explanation may be that this Dorset culture worked northward and became at a later stage still more influenced by the Eskimo. The Thule culture is in this way in some places contemporaneous with the Dorset culture, but in others succeeds it and has probably extinguished it. It is easy to understand that with the advent of the better equipped and more aggressive bearers of the Thule culture the Dorset people were forced to give way and gradually succumbed (897 a).

STRONG's stone culture sites in eastern Labrador.

Yet there is in Newfoundland-Labrador evidence of a still older culture. Between Hopedale and Nain, STRONG investigated three old sites (906, 1043) of which the stone tools (large flints, arrow-heads, chipped scrapers, crescent-shaped knives) differ from both the Eskimo relics and the Naskaupee Indians' bone and wood culture. They also possess some unique artefact types: gouges, a ground chisel and oval celts. Some isolated finds of stone adzes are also conspicuous. The stock of tools gives the impression of Indian affiliation, and STRONG considered them to be the remains of an old Indian population of long ago — long before both the Eskimoes and the Naskaupee; two of the sites he assumed were of Pleistocene age. Observations which I myself made on Satosuakh in the Nain archipelago seem to agree very closely with this assumption; the last mentioned site being of early post-Glacial age.

There is very little probability that these sites have anything in common with the Dorset culture or that of the Eskimoes, for they contain scarcely anything of the materials characterizing the Labrador Eskimo sites and the Thule culture: artefacts of bone, antler, ivory, or steatite. Moreover these old stone culture sites lack entirely the surface indications or the abundant bone debris that mark the Eskimo remains. It seems therefore most probable that this complex represents an old Indian culture.

It is moreover impossible to decide whether this culture has anything in common with the remains of an old Indian culture in the southern part of Labrador: the clusters of chipped points and flakes at the head of l'Anse du Diable (584), numerous spear and arrow-points and parts of highly polished stone gouges and sherds of pottery with roulette decorations like those in the Algonkin sites in Ontario discovered by WINTEMBERG, near Blanc Sablon and Bradore, and the workshop with strongly patinated flakes but no pottery or bone near Tadousac which SPECK believes to be very old, proto-Algonkian or possibly related to the Beothuks.

In the present state of our knowledge one is disposed to conclude that in Labrador there have been different waves of invasion: (1) a very old Indian [?] layer, (2) the Dorset culture, (3) the Thule culture (4) the recent Eskimo culture, and in very recent times (5) that of the Naskaupee and the Montagnais Indians.

Theories concerning the origin and migrations of the Eskimoes.

Several theories regarding the origin of the Eskimoes and their migrations have been put forward on the basis of the archaeological and ethnological observations made by American and Danish explorers. Space permits of the mention of only some of their salient features; the more so as the stage of speculation has not yet been left behind; the deeper we delve into Eskimo race history the clearer becomes our ignorance, as BIRKET-SMITH, one of the most prominent Eskimo experts, stated even in 1940.

Most explorers are of the opinion that the Eskimo culture rose in the regions round about the great lakes and rivers of northern Canada. Not very long ago, having detached themselves from the Indians whose development led them to the wooded lands, the Eskimoes occupied land on the barren tundra. Later on they left that part in the wake of the enormous spring trek of the caribou and travelled until they arrived at the ice-bound storm-beaten coasts of the North-West Passage. Here, according to KNUD RASMUSSEN for example, the whole of their material culture became gradually adapted to the ice of the Polar Sea and the big game of the coastal waters. This meant a revolution. The salmon spear became a seal harpoon, the open canoe of the rivers was transformed into the covered kayak, the stout one-man craft which sails the open sea in every kind of weather. They built the umiak for their hunting trips, a strong transport boat with a wonderful capacity. They made winter houses of stone, turf, and whalebone or of wind-blown snow. From the bones of marine animals, the tusks of the walrus and the narwhal and the antlers of the caribou, they worked out ingenious hunting weapons (cf. 635, 79, 489). The seal provided them with food, clothing, and coverings for boats and tents, and its fat was converted into light and heat for the winter-houses. The bearers of the Thule culture lived in small settlements forming communistic societies without chiefs, even though they recognised the advantage of bowing to the word of the best hunter or the strongest man (779).

After their arrival at the ocean shore the tribes moved slowly westward as far as the shores of the Pacific. In course of time the Alaskan group gave rise in its turn to a new type of culture: the whale-hunting or Thule culture. Later this spread eastward, all over Arctic America into Labrador and elsewhere. When Eric the Red arrived in Greenland five hundred years before Columbus went to America, that country had been visited and inhabited long before by the bearers of the Thule culture.

Later, according to this theory, a second group moved out of the central region to overcome the Thule people and to become the present-day Eskimo, the 'Eschato-Eskimo' (75, 76, 77, 78, 79, 80).

According to BIRKET-SMITH the small remnant of the Caribou Eskimoes (70 a, 74 a) in the interior westward from Hudson Bay is a relatively unchanged group of the population from which all the other Eskimoes arose.

MATHIASSEN (635, 639, 64 a) on the other hand, regards the Thule culture as the original Eskimo culture, the first to be spread eastward over the Arctic coast of America. To him the Caribou Eskimo are descendants of Thule people who went into the interior and gave up many of their former customs.

The most modern theory of this problem has been put forward by JENNESS (493, 494 a). Some time apparently in the first millenium A.D., Eskimo tribes from Arctic Alaska began to spread eastward, dropping settlers all along their route. Some families hugged the mainland and continued to Hudson's Bay; others scattered over the islands to the north and eventually reached Greenland.

Meanwhile, other and more primitive Eskimo roaming the hinterland of Hudson Bay sent out colonists to the coast of the eastern Arctic: Ellesmere Island, Greenland, the coast and islands of Hudson Strait and Labrador, or they traversed the heart of the Labrador peninsula and took possession of the northern headland of Newfoundland. Whether this movement preceded or coincided with the eastward movement of the Alaskan Eskimo is not settled: JENNESS suspected that it started several centuries earlier.

In places where the two peoples subsequently clashed the western Eskimo gained the mastery. There is reason to believe that they differed not only in culture but in physical type from the eastern Eskimo, both those who remained inland and the 'Dorset people' who settled on the coast. The eastern natives seem to have acquired the features of the neighbouring Algonkian people with whom they intermarried for many centuries.

About A.D. 1200 a new impulse can be detected surging through the Arctic. The Indian-like Eskimoes behind Hudson Bay began to stream seaward, to the Arctic coast northward and eastward. Gradually these newcomers swamped the inhabitants — both the Thule people and their own kinsmen of the Dorset culture — until they held undisputed sway from Coronation Gulf to Labrador; only a few Thule people managed to survive until the beginning of our century on Southampton Island. The Dorset culture disappeared before the arrival of Europeans. The majority of the seal- and whale-hunting population on the rising islands in the far north made their way to Greenland, where they may have helped in overwhelming the Norse settlements; others retreated to the mainland, only to be submerged by the tide of Eskimoes from the interior.

JENNESS concludes: we are now in a position to understand why the present-day Eskimoes of Canada fall naturally into three divisions. (1) The natives of the Mackenzie River delta (and also, until 1902, the inhabitants of Southampton Islands) are descended from some of the old Thule people. (2) The 'Caribou Eskimo' on the Barren Grounds behind Hudson Bay represent the survivors of the second great reservoir of the race, the inland Eskimo, now dwindled to a fast vanishing pool. (3) The Eskimo who flowed out of this inland reservoir about A.D. 1200 and overwhelmed the earlier coast dwellers now occupy the whole coast-line from Coronation Gulf to Labrador and in their new environment have gained a fresh lease of life and vigour.

JENNESS' theory applies especially to the eastern Arctic of America. In Labrador we still find Group 3, whereas Group 2, which perhaps represented the so-called *Tunnit*, died out a few centuries ago.

Each new discovery has generally proved to introduce modifications of the still comparatively young theories of the origin of the Eskimoes based upon archeological findings. It would therefore be surprising if the last word has yet been said on this question. For example does not the Ipiutak culture — at least 2000 years old — and the skeletons of its bearers discovered at Point Hope in Alaska give promise of quite new points of view in this regard. It will be best to await the results of HELGE LARSEN's investigations before we decide to support the one or the other theory. Cf. (492, 493, 516, 638, 639, 640, 829, 886, 887).

THE ORIGIN OF THE INDIANS

still lies in complete darkness and there is no possibility of systematically dealing with this question here. STRONG's discovery (p. 451) certainly appears to show that Labrador had an (Indian?) population already before there were any Eskimo in the country. This is also indicated by my observations on Satosuak in the Nain archipelago where the findings are probably derived from a period several thousands of years before our era. We shall later on return to the spread of the Labrador Indians in historic times (p. 578 sqqq.) and touch upon some theories regarding their separating out from the great body of prehistoric population of America (p. 697 sqqq.).

The study of the Labrador Indians offers undoubtedly one of the most grateful and important tasks which the peninsula has for a trained ethnologist.

The Eskimoes or Innuit.

The provenance of the denomination. The Eskimoes never call themselves by this name; they use the designation innuit (plur. of innuk = person), which simply means 'people', or 'men', calling the rest of mankind 'the foreigners', *'Kablunat'*, *'Kablunaet'* or *'Kablunak'* (936) which is untranslatable. Translations such as 'inferior beings' (387 a) or 'sons of dogs' (761) are not exact; only later was this applied to white men following BOAS. HAKLUYT in 1584, in his *Discourse of Western Planting'* seems to have been the first European writer to use the name Eskimo in the literature; his form was »Esquimawes». *Ash'ki'mai* is the Cree Indians nickname for them and signifies: raw flesh eater; the Montagnais Indians of Labrador call them

Iees'te'mu which means the same thing. One point to explain why the Eskimo will eat raw meat while the Indian never does, is cited by SPECK (871): The former is sometimes prevented by nature from preparing it by means of fire, as e.g. when game has been killed on the sea ice, whereas the Indian game inhabits the timber, where fuel is obtainable.

The Newfoundland fishermen call them H u s k i e s or H u s k i m a w s. They also bear the name of *Carolit, Karalit* (434, 325) in older documents; this is used in part of Greenland and has perhaps been transferred by the Moravian Missionaries to Labrador; it has been argued that it has had something to do with the term *skræling* in the Icelandic sagas. We use the name Eskimo here because it is the most general.

The Census of the Eskimoes in Newfoundland-Labrador.

As the area inhabited by the Eskimo has been considerably reduced in historical times (p. 479) it is psychologically comprehensible that the opinion general both among the learned and the laity likes to assume that the number of them has also declined. PACKARD (716) calls the Labrador Eskimo a doomed race and this has been stated by many others (e.g. 364, 321). KOCH points out that while the numbers of the settlers is increasing the Eskimoes are decreasing because of infant mortality; the settlers are moving farther and farther to the north (528). STEWART notices (897 a) that in spite of fluctuations the general trend of the Labrador Eskimo population is clearly downwards. Dr PADDON writes (731) that although there has been a slight rise in number since the great 'Spanish Flu' epidemic in 1918 (cf. table, p. 458), it is doubtful if there is really enough healthy bloodstock to recuperate the race. However, research work on this question has not been very satisfactory. The population figures obtainable do not go very far back in time, and added to that it is impossible to judge of the reliability of the older ones.

No trustworthy evidence is obtainable as to the number of Eskimoes in olden times. The Moravian Mission estimated their numbers at 3000 in 1763, CURTIS in 1773 from Straits of Belle Isle northwards to Ungava Bay at 1625 persons. What figures are obtainable have been summarized in the following table and given here for what they are worth, but they do not allow the question to be settled. As to the variation of the population the curve shows slightly erratic movements for the individual years.

The most reliable figures I know regarding the Mission's stations have been collected with great trouble by the Rev. PAUL HETTASCH who was

Statistics of the Eskimo Population in Newfoundland-Labrador.

Geographical groupings	1763[2]	1764[39]	1773[1]	c:a 1800[23]	1813[2]	1821[38]	1828[38]	1835[38]	1836	1840[2]	1850[2]	1856[10]	1857[7]	1860[2]	1863[29]	1866[10]	1870[2]	1871[28]
From Nachvak north into Ungava Bay	210																	
Killinek (founded 1904)																		
Nachvak (Nuchvak)	60																	
Ramah [Noolaktucktoke] (founded) 1871, abandoned 1890)	30																	
Lamson Bay [Chukleluit]	40																	
Saglek Bay [? = Chuckbuk]	140																	
Hebron [Kannuklookthuok] (founded 1830)	345							148	148	179	346			306	313			
Napawktoot	70																	
Okkak [? = Kunedlooke] (founded 1776)	360			48[35]	394	255	394	251		352	408			314	327			
Nain [? = Nanyoki] (founded 1771)	100			63[36]	168	168	232	278		298	314			277	275			
Zoar (founded 1865, abandoned 1890)																		
Hopedale (founded 1782)				51[37]	149	149	176	194		205	229			241	248			
Makkovik (founded 1896)																		
Rigolet [Karwalla]													10 f.					
Belle Isle [Obuctike]	270	c:a 400																
Total	1625		c:a 3000[3]		× 711					1034[4]	1297[5]	c:a 1300[31] c:a 1200[26]		1138[6]	1163[14]	1048[11]	c:a 1200	1324

Geographical groupings	1874[10]	1880[2]	1881[30]	1884	1886[15]	1887[16]	1890[2]	1895[3]	1895[32]	1904[10]	1904/05[18]	1905[20]	1906/07[18]	1908[24]	1912[2]	1916[23]	1926[25]	1933[22]
From Nachvak north into Ungava Bay											44	48	87[19] 27[41]					
Killinek founded (1904)																		
Nachvak (Nuchvak)																		
Ramah [Noolaktucktoke] (founded) 1871, abandoned 1890)		44			71		59					c:a 30	69[41]					
Lamson Bay [Chukleluit]																		
Saglek Bay [? = Chuckbuk]																		
Hebron [Kannuklookthuok] (founded 1830)		202			207							183	180[41]					
Napawktoot																		
Okkak [? = Kunedlooke] (founded 1776)		329			308		350[33]					350	329[41]					
Nain [? = Nanyoki] (founded 1771)		282			214		263					270						
Zoar (founded 1865, abandoned 1890)		315			90		89									35		
Hopedale (founded 1782)		130			160		331					250						
Makkovik (founded 1896)												150						
Rigolet [Karwalla]																		
Belle Isle [Obuctike]																		
Total	1176[12]	1302[7]	1150	1365[27]	1050	× 1500	1092	1290[9]	1450[17]	1330[13]	34	1281[21]	34-40	1200[34]	1216[34]		1300[34]	c:a 1300[34]

kind enough to allow me to use them here (Tab. p. 458). It must be remembered that the Karwalla or Rigolet Eskimoes (about 50 individuals) are not included.

It is not easy to judge from these figures whether the number of Eskimoes in Newfoundland-Labrador has any real, intrinsic tendency to decline as is mostly believed. When severe epidemics rage these people, like other aborigines, can decline in numbers by 30 %, as they did after the 'Spanish sickness' (influenza) ravages of 1918—1919 in Labrador; of 310 in Okkak 216 died in a few days. But such sudden drops are usually soon compensated by nature herself and this seems rather to be confirmed by the curve. BELL's observation that the Christian Eskimo could not be compared with the others is easily understood: the children of the igloo are differentiated at an early stage by the hand of death so that only the strongest survive the age limit of infant mortality. — Yet so many different factors come into play here that each of them must be specially judged before any reliable answer can be given to the question:

Are the Labrador Eskimoes a vanishing race?

The history of the primitive savages has mostly been: slowly retreating from the outposts of civilization and dying from its diseases (614).

When we look at the tables above it is evident, even taking into account some uncertainty in the primary figures, that the stock of the Eskimoes as a whole has considerably diminished during historical times, beginning about 1775. From this it has been inferred that they are a vanishing race: under civiliza-

[1]) CURTIS. [2]) Moravian Mission's estimate (Hawkes). [3]) The total population of the coast. [4]) North of Hebron emigration towards Ungava. [5]) In 1842 influenza; seal scarce; 59 persons died from epidemics and starvation in 1855. [6]) In 1857 dogs and wild game infected by mysterious disease, animals died in large numbers. [7]) Eskimoes and settlers. In 1876 whooping-cough, over 100 died. [8]) BELL. [9]) Calculated at 5 persons per family; including also the ca. 35 Karwalla Eskimoes and south of Hamilton Inlet some 5 Eskimoes. [10]) MAC GREGOR. [11]) practically no settlers. [12]) + 115 settlers; PACKARD following HARTON and HARWEY noted 1700 Eskimoes. [13]) 1018 Christians + 31 pagans (1 in Hebron, 30 in Eclipse Bay +280 settlers); in Nain in 1900 80 of the 350 Eskimoes died of typhoid fever introduced from Chicago. [14]) BELL: in the 1860's 1400 Eskimos at the Moravian stations. [15]) BELL; PACKARD following LA TROBE. [16]) Between Hamilton Inlet and Ungava, PACKARD. [17]) BELL: at the mission stations 1400 + northwards to Chidley 50. [18]) HANTSCH. [19]) All appertaining to the Ungava group. [20]) MC GREGOR: tendency to settle southwards, lack of firewood. [21]) In Okkak influenza killed 65 Eskimoes in 1904; the stock still increasing compared with 1886. [22]) The Roy. Commission. [23]) HAWKES. [24]) Moravian Mission Atlas. [25]) Newfoundland and Labrador Pilot 1929. [26]) About 1200, PACKARD following LA TROBE. [27]) CURLING stated: from Blanc Sablon to Cape Chidley in 1884 4211 persons, between Hamilton Inlet and C. Chidley 1425 person of whom only 60 white people. [28]) REICHEL: at the mission stations 1124 + north of Hebron 200 pagans. [29]) REICHEL in 787 a. [30]) v. DEWITZ: 1100 at the stations + about 50 in Aivíktok (Hamilton Inlet). [31]) 1204 Christians. [32]) With Ungava Bay and Hudson Bay the total number of Eskimoes in Labrador was about 2500 in 1895. [33]) In Okkak in 1892 about 400. [34]) For the time 1901—1936 see special table to follow. [35]) GOSLING: 22 professed Christianity. [36]) GOSLING: 30 professed Christianity. [37]) GOSLING: 33 professed Christianity. [38]) GOSLING. [39]) GOSLING: PALLISER made peace with 400 Eskimoes at Chateau Bay in 1764. [40]) DILLON WALLACE noted 1127 fullblooded Eskimoes. [41]) According to DILLON WALLACE spring 1906.

Year	1901	Individuals	1283		År	1918	Indiv. 875 Influenza, small-
»	1902	»	1273		»	1919	» 860 pox and measles
»	1903	»	1296		»	1920	» 867
»	1904	»	1298		»	1921	» 859
»	1905	»	1321		»	1922	» 891
					»	1923	» 895
»	1906	»	1309	(Flue epidemic) in Okkak	»	1924	» 919
»	1907	»	1304	» » Hopedale	»	1925	» 904
»	1908	»	1253	» » Nain	»	1926	» 937
»	1909	»	1270		»	1927	» 948
»	1910	»	1229		»	1928	» 968
»	1911	»	1250		»	1929	» 975
»	1912	»	1272		»	1930	» 987
»	1913	»	1261		»	1931	» 1006
»	1914	»	1276		»	1932	» 1017
»	1915	»	1274		»	1933	» 1054
»	1916	»	1244	measles in	»	1934	» 1051
»	1917	»	1271	Okkak	»	1935	» 1092
					»	1936	» 1135

These figures have been plotted in Fig. 215.

tion with the white man's food and dress they must disappear from those northern confines of the earth which they have made their own and in which no other branch of the human family can or will succeed them (325).

Let us consider the question more closely, as far as the scattered information allows; most valuable are Dr. HUTTON's expositions which we will follow here.

The individuals are mostly strong and healthy.

JOHN DAVIS (209) wrote in the 1580's of the Labrador Eskimoes: The people are of good stature, well in body proportioned, with small slender hands and feet, with broad visages, and small eyes, wide mouths, the most part unbearded, great lips and close throat. — This also holds good to-day.

As if sprung from the earth the Eskimo suddenly stands before one like a ghostly shape; a small shock-headed man; he is a burly, muscular fellow, sturdy and squat, with a magnificent pair of shoulders, in every respect a normally developed type. The face is broad, ruddy and stolid, his keen brown eyes gleaming and twinkling under a great mane of shaggy hair. The skin is somewhat darkly pigmented and browned with the winter air and the frost. The face is always smiling, often shining because smeared with grease. He wears his hair long because he usually walks about with uncovered head

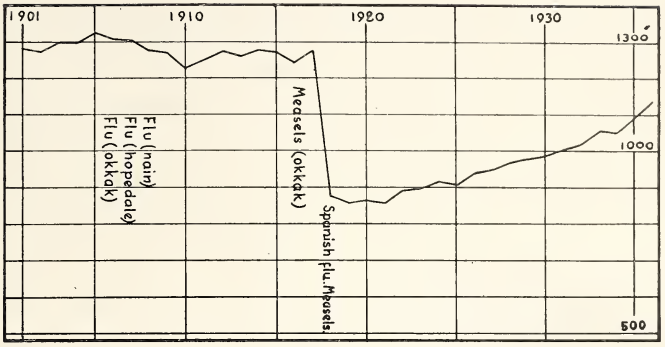


Fig. 215. The influence of the 'Spanish Flu' epidemic in 1918 on the numbers of the Eskimo population of Newfoundland-Labrador. Cf. table p. 458. The Lake Melville Eskimoes are not included.

even on the most bitter snowy day, cf. Figs. 216, 217 and 218. Even when his days as a hunter are at an end there remains a hint of bygone power and prowess in eye, arm, and shoulder, and great dignity in the rugged face under the few wisps of the grey, straggling hair of the stout men and the buxon mothers; Fig. 219. Beauty cannot be said to exist among them, but there is something very attractive in the young people, cf. Figs. 220 and 221. Most of the worthy matrons on the contrary are anything but lovely with a pipe in the fat face. It is better not to notice the malodorous smell they spread which is characteristic of them all: it is the smell of seal-oil sodden boots and harness, cooking and bedclothes, — it is a natural thing, partly the effect of the diet. On the other hand the Eskimo says: we can always tell if some of you have been in the house, you Kablunaks have a smell of your own (cf. 472, 474, 476, 478).

These people are unusually powerful physically even in our days; they can endure what would kill one of us outright; hunger and exposure belong to the very existence of the hunter and only seem to harden him. Hutton, their surgeon for five years, states that their powers of recovery after injury are marvellous.

Pathological conditions.

We must not, however, forget that the white people have brought among them diseases previously unknown there: the gravest are tuberculosis and syphilis. It is not possible for me to estimate the degree of the influence of these scourges on the Eskimo stock; for details of these the reader is referred to Hutton (475) and Suk (910) (cf. 897 a; 17, 116, 909; 440, 824).

Suk found tuberculosis quite new among them and probably brought there by the whites. Hutton earlier stated that it was not a widespread cause of death among them; and Suk says of the Eskimo of the coast: it is a stock without any history of tuberculosis and in consequence no immunity at all. It is probable that the disease has been among them only a few decades and everything goes to show that it is not so much a question of constitution as of the history (910). This disease is here acute, of the galloping type; both lungs are usually affected and death may result in about six weeks from the appearance of the first symptoms (475). Suk considers that this is why we see so little of the disease among the Eskimo.



Fig. 216. Eskimo girl from Cut-throat. Photo the author, 1939.

Suk's investigations have shown further that an overwhelming majority of the infected cases are to be found among the mixed breeds, especially those who live on European food and often in not sufficient quantities. This is not very surprising; Grenfell calculates that one-third of the deaths among the settlers on the south coast of Labrador are due to tuberculosis.

On the other hand those pure Eskimo who, in spite of the proximity of the white man, still maintain their old dietary are particularly free from tuberculosis, whereas the settlers, who live on the white man's food and have very little of it, lacking especially fresh meat and therefore resorting to tinned meat, are in a different position. It is no wonder that once having settled there tuberculosis takes its greatest toll among these quiet, friendly people (364). The same is to be said of beri-beri, scorbutus, and other avitaminoses which do not seem to occur among the Eskimoes, but certainly among the settlers.

The northern coasts of Newfoundland-Labrador long remained free from syphilis; in the so-called heathen graves for instance Suk did not find any trace of osseous syphilis (910). The disease began in 1902 with some Eskimoes who had visited an exhibiton in the States, and it spread rapidly but insidiously (475, cf. p. 472). Few of this party returned to Hebron, and they were enriched

only by these heirlooms of civilization, the germs of which most effectively put a stop to the growth of the community and left people who were a constant danger to every Innuit on the coast, says GRENFELL (364). In 1909 the disease was also noticed among an isolated tribe in the north; the most likely origin was the visit of a whaling vessel (475); in another case it was traced to a vessel which used to visit some of the northern stations (910). HUTTON, who left his medical work on the northern coast in 1912, had not noticed a single case in the tertiary stage.

Among the Eskimoes and the mixed breeds on the northern coast the disease runs about the same course as in most parts of the world. SUK stated in 1926 that the future outlook is undoubtedly grave, for the plague is increasing. He met not a few women each of whom had several abortions on record, most of which he had sufficient evidence to ascribe to syphilis. He concludes that the future of this group is not altogether cheerful.

PADDON stated in 1938 that two sinister pairs of initials, 'T. B.' and 'V. D.' are strong arguments against the recovery of the Eskimo race. There is the menace, a health and social problem of the first magnitude, and it is not overdrawn. It cannot be handled by sporadic visits of a patrol boat operating over five hundred miles of coast. It demands that a trained worker with adequate equipment spend the necessary time in each of the chief centres. If anything is to be done, there is no time to lose.



Fig. 217. Eskimo boy at Nain. Photo the author, 1939.

Marriages.

The Eskimoes love children. If they have none of their own their desire to adopt is very strong, for they require some one to look after them when they grow old as their own children would have done. A home need not remain childless; an orphan never needs to lack foster parents; someone always comes forward with the offer of a home. Adoption is also very common; families



Fig. 218. Eskimoes working temporarily for Hudson's Bay Company in Nain. Photo C.-G. Wenner, 1939.

sometimes exchange a child or two; a family wanting a boy hands over a superfluous girl (476).

The Eskimoes marry early, especially the young women. The younger widowers were readily consoled in earlier times; the men only reluctantly wait the six weeks insisted upon by the missionaries before they marry again (761). Their excuse is that they need help in the home.

The number of marriages is however not so great as is desirable. The tragic fate of this race is their lack of women; but unfortunately I have no exact

figures for Labrador, though the preponderance of males there is not so great as for instance among the Netsilik Eskimoes where BIRKET-SMITH in 1921 found 247 males to 176 females (80 a). This was found to be the result of the frequent practise of killing new-born girls. But this would never happen in Labrador. The birth-rate of girls among the Eskimo of Labrador is meanwhile much lower than of boys, and therefore the many young men have no possibility of marrying. This is the more to be deplored as even the widows do not in these days seem willing to remarry, possibly because the life of an Eskimo wife and mother is still extremely hard. When a hunter wants a wife for company and to perform the duties of the home, — drying the meat, sewing the boots, cleaning the house, mending the clothes — it may be that he must resign himself to going without for there is no girl left for him (475). This may be the explanation of the fact that in bygone times the girls were often taken as wives before they had attained puberty. This is also said to be the reason why they seldom have large families, 2, 3, or 4 children being the usual number, says TURNER (183). A boy was not considered a grown-up hunter able to marry until he had caught his first seal.

In former days when the wife of his youth grew too old and feeble to do all the work of his house the hunter would take another wife. Polygamy was a normal institution, and the lack of women was then still more disadvantageous for prolificness as the young men were not able to find wives. It was also the custom then for a young man to buy his wife, his parents offering seals on his behalf; if it seemed good the bargain was struck and the delighted bridegroom led his purchase home; the most important of all is said to have been that she should be a good bootmaker (476)! It can be said that it is very nearly a century since polygamy was abandoned.

Birth-rate and infant mortality.

The nativity may be considered normal for the marriages but the infant mortality is terribly high. The following percentages give a very instructive comparison (897 a):

	1901	1902	1903	1904	1905	1906	1907
Eskimoes' Births	4.4	4.5	6.0	4.3	5.8	4.3	4.2
» Deaths	4.6	6.2	5.8	9.6	7.8	6.5	6.6
	— 0.2	— 1.7	+ 0.2	— 5.3	— 2.0	— 2.2	— 2.4
Settlers' Births	3.2	2.8	4.4	2.7	4.0	3.0	2.7
» Deaths	2.1	2.8	1.0	2.3	1.4	2.0	2.3
	+ 1.1	± 0.0	+ 3.4	+ 0.4	+ 2.6	+ 1.0	+ 0.4

From this it appears that the birth-rate is higher among the Eskimo than among the settlers (see below), but the death-rate is also much higher. While there is an excess of births over deaths among the settlers, the opposite is often the case among the Eskimo. We must however remember that only a few years are included in the table.

It is a generally known fact that infant mortality among the Labrador Eskimoes is distressingly high. What is the cause? The unhygienic conditions. *Horribile dictu,* Suk says, even among the Eskimo women bottle-feeding is a fashion, that in practising it one has to resort to condensed milk and that it is hardly possible to induce the mothers to keep the feeding bottles clean so that the mortality of such infants is considerable.



Fig. 219. Two happy Eskimo couples at Nain. Photo the author, 1939.

The idea has been put forward that the frequent marriage of near relatives is against their chances of large families. These little people have gone on for years marrying and intermarrying until it is hard to find a family that cannot claim kinship of a sort with the greater part of the village (476). However, one does not get the impression that either the physical or mental qualities have suffered from this intermarriage; I do not know of any case of imbecility among the Eskimo; but things are otherwise among the white settlers.

Longevity.

The relative rarity of aged people soon strikes the stranger (761). In olden times it was customary to kill the aged and infirm (cf. p. 551). To-day they patiently and devotedly care for their aged ones; the old parents are sure of a home with some relative, and if they have none the hospitality in the hearts of the people makes them open their homes to the needy.

These people undoubtedly grow old quickly, subject as they are to the rigorous environment of the Labradorean Atlantic coast. A man is old at forty-five, the hunters being by that time worn out by the hardships of the autumn seal-fishing. The face of a girl about twelve years old would pass as belonging to a woman of thirty (604). After fifty a man begins to decline and

few live long after sixty, writes HUTTON (472); he had known a few over seventy and with astonishment one heard of a woman who lived to be eighty-two. It must be unique to meet a greatgrandmother. The very old people are always those who have clung closely to their native food and can speak of having been mighty hunters once upon a time, adds this surgeon. The census of 1935 lists fifteen individuals, mostly females, of seventy years or over at Hopedale, Nain and Hebron (897 a).

The general absence of longevity is therefore not a sign of lack of vitality; it is due to the more or less hard life in the struggle for existence. Yet there are among the Labrador Eskimoes old people who have lived till over eighty and worked regularly until the last. It can truly be said that they die in harness, dropping out as if too tired to go any further and passing away without illness or suffering (476).



Fig. 220. Eskimo children at Nain. Photo the author, 1939.

Liability to accidents.

The high death rate among little boys HUTTON thinks is very greatly due to the laxity of their upbringing, as the parents refrain from wisely controlling them. The children which have survived the age of infant mortality are well fed and well clothed. They are left a great deal to themselves and this helps them to grow up strong and hardy: the perky little rascals shall one day be big hunters! Yet not one of them has learnt to swim. It is risky to venture in a small boat on the fringe of the Ocean, or to try to sail on an ice-floe even on calm days. If they fall into the water it is not easy to get a hold on the slippery kelp-clad rocks of the beach, the suction of the retreating water will bear them down again. Many a fine and promising lad and many a staid man in the prime of life have been the victims of the merciless elements of snow or storm (478).

Later on the life of a grown-up Eskimo seems very matter-of-fact: he goes hunting, he drives his dog-team, he tramps away on his snow-shoes to set his fur-traps, but, says HUTTON, one must live among them before one can guess at the risks they run and the dangers they meet in their everyday life.

None of the circumstances mentioned above may be the decisive cause of the slow growth of the Eskimo population in the last hundred years. A much more potent obstructive element has been, it seems to me, the

Intermixture with white men.

The immigrants of course needed wives to manage their houses. Consequently the intermixture started early. Thomas Hickson (1063) recorded as early as 1824 from Hamilton Inlet that the probable number of the inhabitants there was as follows:

Pure Eskimo adults	100	
Pure Eskimo children	60	160
Half-Eskimoes	60	60
European settlers	90	
Canadian settlers	16	106

Hickson tells of Eskimo women who lived in a state of concubinage with their European partners, a practice very common in this part of the world. It was however indispensable for the early white immigrants to have wives, and thus the habit developed of the white men taking Eskimo wives. In this way the s e t t l e r type arose, i.e. white and Eskimo mixed breed in various shades and degrees. The Eskimo women were not unwilling to marry the whites, and the whites have found that the attractive Eskimo girls are splendid and faithful wives. It seems that the talents of the Eskimo in many cases have a good opportunity to develop through marriage with the whites; the second and third generations are considered very gifted.

A second source of admixture has been the white Labrador fishermen (716). Until 1864 few of them visited the coast north of Hopedale, and even in 1900 very few fishermen went beyond Nain or Port Manvers (218). In any case many of these foreign fishermen are said to have behaved most outrageously. The missionaries (604) say that they not infrequently interfere in the family affairs of the Eskimo even to-day.

The assimilation with the whites has of course checked the increase of the pure Eskimo population. There are certainly no settlers north of Makkovik without some amount of Eskimo blood in their veins. Another opinion which seems to prevail is that the danger of the Labrador Eskimoes being exterminated by intermixture with the whites has passed. However, such mixed marriages are still not uncommon to-day.

Compared with the full-blooded whites, the half-caste settlers here are for a great part healthy and hard-working. Specialists who know about these

relationships are of the opinion that the intermixture with the Eskimo disposition has been of great advantage: the larger the percentage of Eskimo blood, the better adapted to the milieu are the mixed people. It is this mixed breed part of the population, say those who best know the conditions (GRENFELL, PADDON), who will form Labrador's new population, in the same way as the so-called Greenlanders in Greenland. CAREGA (126) expressed the opinion that it was just the intermixture of the white blood that increased the Eskimo's physical powers and reproduction capacity. I myself am not quite sure about this conclusion. CAREGA's opinion has also been opposed by JENNESS (491) who stated that the whites have brought with them numerous diseases of which the influence on the health and fertility of the natives has not yet been elucidated. In any case it is certain that this blood-letting of the Eskimo stock is inimical to its reproductivity.

Very few somewhat reliable figures are obtainable of the proportions of full-blooded Eskimoes, mixed bloods, and whites constituting the population of the Labrador coast. It seems probable (897 a) that miscegenation, starting earlier in the south, reaches a peak around Hamilton Inlet. It seems to me not impossible that in earlier times considerable numbers of mixed bloods from the south were also introduced into the northern communities, in spite of the shift of population which took place in the last half-century from the northern to the southern stations (604, 897 a).

Report gives the following details for the coast (603, 604):

in 1856	practically no	half-castes
in 1874	115	settlers
in 1904	280	»

On December 31st 1905 (603, 604):

Killinek	78	Eskimo	3	settlers
Ramah	75	»	4	»
Hebron	166	»	8	»
Okkak	329	»	0	»
Nain	233	»	54	»
Hopedale	123	»	110	»
Makkovik			138	['nearly all settlers']

In 1926 SUK (910) was of the opinion that at Hebron the people were almost entirely pure Eskimoes but for five or six of mixed breed. At Hopedale, Nain and Okkak pure Eskimoes were in the majority, but at Makkovik they were mostly settlers. It is not clear to me how SUK determined the degree of hybridism.

On January 1st 1939 there were large majorities of settlers in Makkovik and Hopedale; cf. Fig. 210. Most of the Newfoundland-Labrador Eskimoes are probably more or less mixed with white men's blood.

The Eskimoes degenerate when they take white men's food.

In the olden days the Eskimoes' life was simple and healthy, PRICHARD writes. The struggle for existence has certainly always been hard. But they lived long and contentedly. Death presented himself to them under the form of hunger or accident at sea or when the old people so to say expired by falling asleep for ever. Not until they met the whites did death wear the face of disease.



Fig. 221. Eskimo children at Hebron. Photo E. H. KRANCK, 1937.

They have a hand-to-mouth existence, sometimes surrounded by plenty, sometimes in want, but there is always food for those who care to get it. Among no other people can be met such a large number of well-nourished and fat faces, slim types are rare. This is due to their open-air life and very nourishing food — animal flesh and fish. Little children are so fat that the eyes are almost closed and the nose is almost hidden in the cheeks; they are a perfect picture of health and well-being (647). The autumn seal hunt gives them their best and most fattening food just when the cold weather begins and they have thus a fine natural protection against the cold. They need no fire to warm them; their physique has been altered century by century to suit the surroundings as was the case with the cave man (761). Dr HUTTON who studied the Eskimoes of the coast while practising as their surgeon at Okkak, is of the opinion that the Eskimo phenotype has got in to a stage of transmutation. In the north generally the Eskimoes are broad and plump with fat, flat faces and sunken noses. Further south HUTTON met lean, sharp-faced Eskimoes with

bony limbs and pointed noses. He thinks that they, too, are pure-blooded and that the change is due to their altered food and habits. The Eskimoes are born imitators, he says, and in the southern stations they have had more contact with the English-speaking settlers who were there for cod-fishing and fur-trapping. It is little wonder that they assumed the settlers' habits regarding food and clothing. Cloth garments took the place of the sealskin, bread and tea and cooked meats replaced the raw meat and blubber. But the result is that the southern Eskimoes are less hardy now; they cannot bear cold well. The children are puny; they can dwindle and die off. These conditions result in a real danger; the natives — the Eskimoes and Indians — degenerate when they take to the white man's food. The Eskimo loses his natural coating of fat to a great extent and needs more clothing, he becomes less able to endure fatigue and the children are often small and weak; so say people who know the Labrador Eskimoes well.

The influence of the altered diet on the type and health of the Newfoundland-Labrador Eskimo was strongly emphasized in my conversations with the missionaries. Many scientists are, as we have seen, of the same opinion, for instance, Suk and Stewart.

Primitive hygiene and epidemics.

The worst scourge of the Eskimo and the Indian is their primitive hygiene and disease.

When the missionaries began their civilizing work among them the Eskimoes were dirty because they knew no better and were content to remain so (cf. p. 516). The filthy floor and the horrible smell in their subterranean winter dwellings must have been unbelievable. Nowadays the schoolmistress has taught the children to be neat and clean, but when they grow up their keenness dies away in many cases so that the race as a whole remains far behind the white people in regard to habits of cleanliness and sanitation. Meanwhile there seems to be a difference in this respect between the southern and the northern Eskimoes; the former who touch the fringe of civilization are far cleaner than the latter. Yet even on the northern coast there are Eskimoes who look after themselves fairly well and they are in their way clean, do not have vermin, and on the whole smell less badly than primitive people in general. When I quite unexpectedly entered the salmon-fishing hut of the Eskimo, Peter Adams, at The Narrows, I found perfect order, and the air was no worse than that of similar huts among the whites. My friend and pilot Julius Nathanael was distinguished by his neat appearance, — and had such good

table manners that I should have been glad to show them to some of my students as an example.

However, indifference to cleanliness can hardly be so harmful in the pure atmosphere of Labrador as it would be in the centres of the civilized world where the air is filled with miasma.

It is also remarkable that the Eskimo use no drugs since the law against the import of alcoholic drinks was put into force; drunkeness has been rare. There was a fatal time when the Eskimo learned to make beer with molasses and a furtive concoction of hard biscuits. The drink was not very strong but the brain of the Eskimo easily became inflamed, and in consequence their evil passions were loosed, women were beaten and various domestic disturbances arose. So far as I could find out this practice has now disappeared completely, and the Labrador Eskimoes may be said to be a teetotal race; when they see a drunk person they keep at a safe distance thinking 'the man has a devil' (475).

Men and women alike smoke very much, but it can scarcely be very dangerous for their health. This habit they acquired from passing vessels, because they know nothing of 'the pipe of peace' (476).

One very distressing fact is the difficulty of rooting out their old habit of employing the native doctors to whom the Eskimo still likes to entrust his physical troubles. Nowadays, it is true, the work of these doctors is quite innocent; all witchcraft, sorcery, magic and the like have passed away in general with other relics of heathen times, Dr HUTTON was able to state. But if the treatment is not dangerous, it is also not wholesome. If an Eskimo has pain in some part of his body, that part is, to his method of thought, broken; and on this idea the native doctors work: something is broken and must be mended. Several of these 'doctors' have gained a reputation for unusual skill in dealing with illness. They use several plants (518) as medicines as tea: the onions which grow on the sea shore are good for scurvy, *Ledum latifolium* is good for fever because it lowers the temperature, *Ledum palustre* is good for chills, tansy for colds, seaweed is a cure for skin disease, dandelion is used to lighten the meat diet. Raw seal's liver is a universal remedy among them. They also make a stew of rosemary twigs as well as of the brain of the cod. A treatment is carried out with lengthy and mysterious manipulations. Physiology is beyond the grasp of their child minds. The native doctor is always shy of letting a foreigner see him at his work, and no doubt he owes his popularity to the old Eskimo conservatism (476).

I was able to note that their powers of recovery after injury are marvellous. But disease is another thing, their power of resistance is low and they are soon prostrate like all primitive people (476). They are extremely liable to infection, those of Killinek more than those of Hebron and Nain who have preserved some degree of immunity. Comparatively harmless diseases like measles or smallpox have been terrible scourges when brought for the first time to the

remote tribes of Labrador (cf. the tragic descriptions left by CARTWRIGHT (134) and DAVEY (205). We read repeatedly in the missionary diaries of other epidemics among the Eskimoes, especially influenza. A form of this last illness visits the villages practically every year, but mostly in a mild form. Yet at intervals it has descended upon them with virulent force and usually caused a number of deaths: in 1842 severe influenza, 1855 starvation and disease, 1857 disease amongst the dogs infected the game, 1876 severe whooping-cough (HAWKES); in 1900 typhoid fever, in 1904 in Okkak influenza (MC GREGOR, HUTTON); influenza raged in Okkak in 1906, in Hopedale 1907, in Nain 1908, measles in Okkak 1906, 1918—1919 influenza, smallpox and measles, in Okkak 216 died out of 310, in Hebron 140 in a few days (HETTASCH: see table above). The records of epidemics are usually imperfect and the causative agents are often uncertain; but the results are reflected in the mission's census records, and with each epidemic the population declines (cf. tables, pp. 456, 458).

When an epidemic starts in a hut it soon spreads because of much visiting. Fatalism is deeply rooted in the Eskimo nature. Sanitary reform, says Dr HUTTON, caused a raising of the eyebrows: 'that is not the way we do; it is not a custom of the people.' Epidemics therefore attack the small Eskimo settlements wholesale, and when an epidemic begins it seldom misses anyone (476); for instance during an influenza period practically the whole population of a station seem to catch it at the same time, the village appears deserted, and only now and then a muffled, dismal figure moves along to the Mission-house to ask for medicine from the House-father. HUTTON reports on the other hand that the ravages of the different diseases vary very much. Influenza comes twice a year, in midwinter and midsummer. But within the memory of man there has never been such a fearsome scourge in Labrador as the sickness which swept the coast in the autumn and winter 1918—1919. When the S/S 'Harmony' arrived in Hebron from Nain in November 1918 the natives began to show signs of having contracted the 'Spanish influenza'; the result was that in the course of about nine days nearly two-thirds of the Hebron people had died. One can hardly imagine what this means. The frozen ground and their own weakness prevented the digging of graves, they buried the bodies in the sea through a gravelike hole cut in the ice and set fire to the houses of the deceased to get rid of the infection (478). From Okkak the story is even worse: what had been a happy and prosperous village, was in a few days wiped out. When after the freezing of the sea communication with the scattered homes in the bays was re-established, the disease gradually spread to the people in camps outside, and whole families died without being able to send for help. One little girl, the only survivor in a household, lived on in solitude with her dead parents and brothers and sisters around her: she ate berries for food and quenched her thirst with snow. For weeks she lived like this, and when some Eskimo boys on their travels looked in at the windows, they thought that they were seeing a ghost. The missionaries went

out and rescued the child. In the village itself and in those lonely camps the savage dogs became more savage still and added to the horrors of the scene. — It was clearly quite a new form of influenza that was brought from England by the mission's vessel and this explains the severe passage of the disease. But, a curious fact, among the settlers the attacks were much milder than among the pure-blooded Eskimoes.

Epidemics under such primitive conditions are a far sadder chapter than in the civilized world, says HUTTON. CARTWRIGHT tells of one PHIPPARD who came on an Eskimo encampment on an island in Invuctok Bay [Hamilton Inlet] where the whole family had evidently died of smallpox. — The caribou Eskimo were almost exterminated by one disastrous influenza epidemic (80 a).

The unfortunate effects which followed from the visits of Eskimoes to different exhibitions have already been referred to. In 1881 eight of them went to Hamburg and then to Paris. Here they contracted smallpox and all died; there were no survivors to take back disease and death to their kinsmen in Labrador. In 1893 some enterprising Americans transported fifty-seven men, women and children to the Columbian Exposition in Chicago; a few of them returned in a destitute condition and brought with them typhoid fever and diphtheria, to which large numbers of their fellows from Hopedale to Hebron fell victim. In 1898 thirty-three Eskimoes went for exhibition to England, other parts of Europe, and America. Only six of them returned in 1902, sick and destitute. They had contracted a most loathsome, venereal disease which has since spread through all the settlements, slowly and painfully killing a large number of the inhabitants. Venereal disease has been peculiarly fateful in these parts; it is widespread among the Eskimo women who, according to what the missionaries told me, are in general distinguished by extreme sensuality.

Whenever the Eskimoes have left their native coasts disease and death have quickly destroyed them (325).

We have now quoted some known examples. We need only insert these epidemics in their proper places in the statistics to obtain a clear idea of one of the decisive causes of the small population increase among the Eskimoes, even if all the information does not bear such terrifying witness as the winter 1918—1919 when their numbers at the mission stations fell from 1271 to 875 or by about 30 per cent in half-a-year, and almost wiped out some populous settlements. The station Okkak was practically exterminated and had to be closed. A new little society: Nutak, arose later south of Okkak.

Conclusion.

From what has been said here we ought, in my opinion, to acknowledge that the human material as such seems physically and mentally sound on the whole. The Eskimo, in his hard struggle for existence, lives long if he can avoid infectious diseases. Dr HUTTON speaks of old Juliana Boase who used to live

at Okkak, one of the few survivors of the influenza epidemic of 1918—1919; he says that at the age of 82 she still travelled to and fro by boat and sledge to Tikkerarsuk, a distance of about twenty miles. There seems to be no cause to fear a decrease of the population if hygienic conditions and knowledge can be introduced systematically in Labrador as has been done in Greenland and Alaska.

So far as I know there has until the present day been only one resident qualified medical man along the whole of the north coast, namely Dr HUTTON (1907—12). Dr GRENFELL and Dr PADDON have only occasionally paid flying visits to that part of the coast where the Eskimo live. The Moravian missionaries have done wonders in the way of surgery. Certainly the effects of the missionaries' teaching appear in the somewhat improved hygiene of the Eskimo but they, of course, are powerless when it is a question of systematically arranging and supervising health conditions and getting rid of the consequences of disease. The Eskimo still lives close to nature and his physical and mental equipment is in general good; but professionally organized medical protection against epidemics and other infectious diseases is necessary. These aborigines ought also to enjoy a permanent medical service such as the rest of the population of the colony of Newfoundland already have. SUK has expressed the idea that the International Grenfell Association should take over the medical care of the north coast also, perhaps in co-operation with the allpowerful Hudson's Bay Company. He has undoubtedly hit the right note.

The present Eskimo habitat in Labrador

is seen from Fig. 222. In our days they occupy the Atlantic coast of Labrador from Hamilton Inlet to Cape Chidley, including the eastern part of Lake Melville, east of the English River. Here they share the produce of nature with the few white people and the half-breeds who have settled there. On the other hand Eskimo are the only inhabitants of the strip of Ungava Bay from Cape Chidley to the Koksoak River. Further, they alone inhabit the enormous spur towards the north-west, called Ungava Peninsula, north and north-west of a line drawn from Hudson Bay about over Lake Minto and the Larch River to the mouth of the Leaf River in Ungava Bay, this line coinciding very much with the tree line. Since olden times the Ungava Peninsula has been noted for its rich supply of caribou; in the watershed district on the peninsula the Eskimoes, both from Hudson Bay and Ungava Bay, used to assemble during the hunting period. Even at the

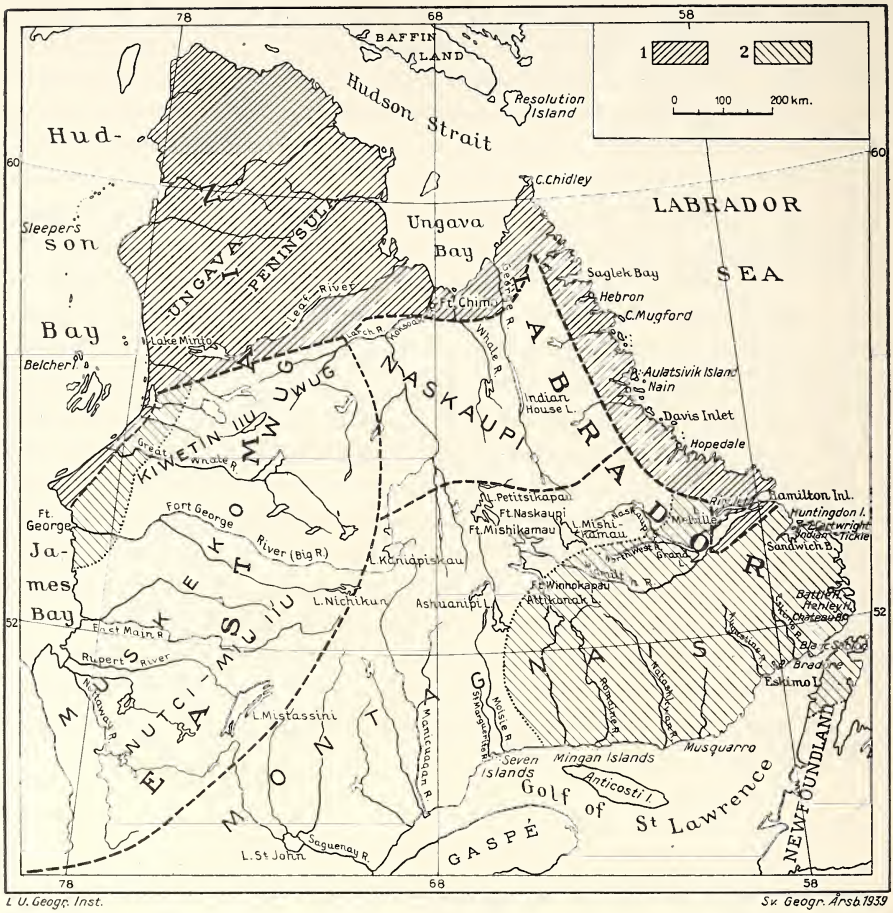


Fig. 222. The habitats of the Eskimoes and the Indians on the Labrador Peninsula (916).
1 = Eskimo habitat at the present time
2 = » » in bygone days.

turn of the century, this hunting had attracted thither the Indians from the forests in the south; and as late as 1912 Flaherty found at Lake Minto the skeleton of an old tent of Indian type (cf. also Low). At the present time however the Eskimoes seem only occasionally and the Indians never to make their way to the inner parts of this peninsula which thus lie desolate and unused by man. On the coast of Hudson's Bay Eskimoes are found at the present time as far to the south as the George River.

There is scarcely any aboriginal people, unless the Polynesians and possibly the Tungus, who are so widely spread on our planet as the Eskimoes. The poorness of nature's resources in their habitat has driven them to divide into territorial groupings to which they themselves have given different names. In Labrador there are three such (see 965). The one living in Newfoundland-Labrador has been called S e r k i n e r m i u t, or S û h i n î m i u t, according to TURNER, meaning the people who keep to the land of the sun, i.e. on the east side of the peninsula or at the Atlantic coast. This large main group comprises the world's most southerly Eskimoes (cf. influence of the cold Labrador current). To it were also reckoned the Eskimoes who in winter lived beside Ungava Bay between Fort Chimo and Cape Chidley, because during the summer they used to wander about the archipelago round that Cape, which is also on the Atlantic.

These people of the sunny side have in their turn divided into a number of small sub-groups each of which has called themselves after the place where they mainly dwell by adding — m i u t [= people], —; see HAWKES' map (424). An example of this is *Ki'lin'ig'miut* from *Ki'lin'nik*, which indicates the district of Cape Chidley, and means the twisted, cut up, pressed together [area]. *Avanêmiut* is another example: it means northerners, and is a collective name for the groups of the north.

The old — m i u t names (see HAWKES' map) are no longer in general use within our area; a group will today take its name from the mission station near, e.g. the Nain station: *Naine'muit*, or after Nain Bay, *Nunaingumiut*. The Hopedale Eskimo call themselves *Arvekmiut*, after the Arvek' [= Whale] Fiord.

These small territorial groups have no connection in our day with any family-clans. As far as is known clan chiefs have never existed among them. It has been usual that a powerful and crafty man has taken for himself the leadership of a small group. Yet he has often been obliged to share his influence with the shaman: *angekok;* that false prophet (934) who was so clear an expression of the dogmatics of the Labrador Eskimo in former times. The struggle between the two usually concluded by the self-elected chief investing himself with the function of the sorcerer also.

The condition of the group division in olden times is less clear (cf. 196); certainly the ancestors of the present Eskimo were not wholly ignorant of ethnical distinctions, as is shown by the numerous tales of the *Tunnit;* these latter can with good reason be termed the bearers of an older Eskimo culture, the so-called Thule culture (see farther on).

The extension of the Eskimoes' habitat in bygone days.

The missionaries KOHLMEISTER and KMOCH speak of the tradition among the Eskimo at the beginning of last century according to which their ancestors from the Canadian district in the north spread out to the east and south over the range of islands on the Labrador coast. The tradition is supported apparently by present ethnographical conditions, and archaeology and agrees with what is known otherwise (cf. p. 452 sq.) following which the bearers of the recent type Eskimo culture about A.D. 1200 invaded from the west. What little has been studied of the archæology of east Labrador indicates also that the present-day Eskimoes' ancestors immigrated there at a comparatively late period. Further it is said (Hopedale) that Indians probably lived at the Atlantic coast before the immigration of the Eskimoes, for below the Eskimo cultural layers Indian relics have been reported such as sherds, and pottery it is known that the Labrador Eskimo never used.

After this invasion the people found the natural conditions at the coast most favorable for hunting. The shore is cut into by fiords, and its broad archipelago with numerous 'runs' and 'tickles' where the seals like to live, offer ideal, well-protected places for catching marine mammals and, during the ice-free period of the year, fish. In the winter again the edge of the ice fringe which forms a good way out to sea becomes a home for the seal, the walrus and the fox. On the other hand the valleys which follow the fiords inland are the home of the caribou, the bear, and fur animals. The supply of this booty has been so great on this coast that the hunters could manage without any great anxiety for the necessities of life if they were only somewhat careful. Such hunting by this predatory people has gone on for centuries on the barren but beautiful coast. The people gradually spread farther south and finally embraced an area, still on the coast, considerably more widespread than at present; cf. Fig. 222 (73, 85, 710, 873, 878).

It has been stated that the Eskimoes during pre-Columbian times probably stretched still farther south than is shown on the map; for instance, they perhaps reached Saguenay on the Gulf coast about the year 1000 (BIRKET-SMITH) and perhaps Quebec; some suppose even as far as Nova Scotia and Maine. HAWKES assumes that scattered groups of them were at one time even as far south as New York State (on the basis of certain archæological findings). Weapons resembling those of the Eskimo have been found in Ontario (WINTEMBERG) and in New York State (SKINNER); also the tools of the Beothuk Indians show a strong influence of Eskimo culture (HAWKES, JENNESS). But here we are touching upon questions which it is impossible yet to judge with certainty (cf. p. 454), and we do better to confine ourselves to the indications on the above map.

It appears to me that the earliest quasi-historical information regarding the Eskimoes is obtained from the Icelandic sagas. In Markland and in Vinland (p. 43) the Norsemen met with *Skraelingar*, about the year A.D. 1000. This name they used for the natives in general, both Eskimo and Indians (920b). When Torfinn Karlsevne saw a large number of skin boats on which long staves swung in a circle in the direction of the sun and gave out the sound of flails, these must clearly have been Eskimoes rowing kajaks with double-bladed paddles, because no other people in this district are known to have used such oars. There is also no doubt that the Skraelingar Torfinn Karlsevne killed on his return journey to Greenland were Eskimoes. But on the other hand there is little doubt that the Skraelingar in Hop he had to fight against were Indians. The sagas give the impression that the Skraelingar in Markland, i.e. Labrador's Atlantic coast, were predominantly Eskimo, while those in Vinland, i.e. north Newfoundland and districts to the south, were Indians. I refer the reader to my detailed explanation of this matter (920b).

From the descriptions given by the older explorers there is often no clear picture of whether the natives they met were Indians or Eskimoes. CABOT in 1497 saw 'savage men clothed in beastes skinns and [who] ate raw flesh and spoke such speech that no man could understand them'. He brought away from these people snares for game and needles for making nets. Because of the latter HAWKES thought that CABOT had met Eskimoes; I am not convinced that he was right (pp. 54, 579). But even if CABOT happened upon Eskimo as little as JACQUES CARTIER in 1534 we need not doubt that such people were already there in the south-east of Labrador. On older maps of these areas there are fine notes of both the Eskimoes' and the Indians' life (p. 55 sq.), as on the map from 1546 of Pierre Descelière de Arques' and the splendid portolan by Nicolas Vallard de Dieppe from 1547; cf. Fig. 10. When the light of history began to dawn on the southern parts of the districts the Eskimo had already spread far to the south on the northern shore of the Gulf of St. Lawrence, where tent-rings, heaps of bone, dilapidated graves and the ruins of earthen igloos bare witness to their extension to the Mingan Archipelago north of the island Anticosti. Europeans found Eskimoes on Eskimo Island at the beginning of the 16th century where they hunted seal and walrus in the spring. One might be tempted to say that the Eskimo had there reached the limit of their natural extension; the icebergs of the Labrador current had guided the Eskimo to the Gulf just as they had guided the polar bear and the Greenland seal thither; where the icebergs ceased, there also stopped the great marine animals and with them the Eskimoes, I think.

West of the Eskimo lived at that time the Montagnais Indians from Seven

Islands and the Moisie River down to Quebec, and these Indians also occupied the country from the sea to the watershed (cf. the Jesuit Relations 1694—1750). North of the Montagnais lived the Naskaupee Indians, *'cuneskapi'*, whom FATHER LAURE met by the Ashuanipi Lake in 1731.

Thus north of the Gulf of St. Lawrence the Eskimo occupied the south-eastern part of the Labrador Peninsula, both the coast and the hinterland as far as a line drawn from Mingan to the Kipekak River; place names at Lake Melville support the assumption that the Eskimo lived all round this lake and its upland till quite recently; Fig. 222 (cf. map p. XXIII in 509). They also frequented the Hamilton River (139, 325). Many people who thought that they were a distinctly coastal people are surprised to find that also in many other places they had spread inland: on maps from 1660 and 1695 they are shown as inhabiting some districts east of St Marguerite River's upper course north-east of Saguenay, where at present only Indians hunt. Clearly such Eskimo have later, family by family, been assimilated with the Indians, conditions which are known for example from Lake Mistassini and Seven Islands' district (873). This fact can be regarded as supporting BIRKET-SMITH's notion that the Eskimo at one time spread as far as Saguenay (73).

It can be assumed that the Eskimoes established themselves in the 16th and the 17th centuries, at least for a time, also upon the most northerly parts of the west coast of Newfoundland. Though it has been supposed that these latter really belonged to Labrador and only undertook occasional treks farther south; CARTWRIGHT noted that in 1771 he saw an Eskimo as far south as Fogo Island, near Twillingate in Newfoundland. There are however some curious pieces of information in the literature which quite definitely indicate that the Eskimo had moved even so far south that they had contact with the Gulf Stream off Newfoundland. With such an assumption it is easy to explain the presence of the three kajaks which were fished up in the North Sea at the end of the 17th century (615 a). Another explanation is that they were brought from Greenland by a whaler which was wrecked in the North Sea (BIRKET-SMITH). On the other hand GOSLING says that no evidence has been produced to show that the Eskimo ever occupied the eastern shore of America south of the Straits of Belle Isle, but that they were in the habit of making occasional summer excursions to the north of Newfoundland, e.g. Fogo Island; it can be confidently asserted that their range has been co-existent with that of the seal on which they mainly subsist and consequently has never been farther south than the north shore of the Gulf of St Lawrence, he says.

The gradual expulsion of the Eskimoes from the southern and south-eastern seaboards of Labrador.

Looking at the map, Fig. 222, of the extension of these people formerly and at present one can scarcely avoid a question: why have the Eskimoes deserted their former outposts? and the answer is: the savages; both the coloured in the interior and the white along the coast have competed in driving them to the north.

At their first meeting $9\,^1/_2$ centuries ago with the Norsemen, hate against the white man was born in the soul of the Eskimo. Icelandic sagas relate that the Norsemen raged among the Eskimo and murdered as for the pleasure of murdering. Historical sources show that CORTEREAL, decoyed aboard his vessel some threescore natives, whether Indians or Eskimo is a moot point, and sent them to Lisbon, where the court jumped to the conclusion that the navigator had discovered a land of great resources, where amongst other things they could obtain brown slaves instead of black (761). Thus the white men brought misfortune and must be opposed.

A red thread running through their folklore is the everlasting struggle between the Eskimo and the Indian. This race hatred must have old beginnings: SPECK thinks that it arose during that distant period when the two peoples first met at Hudson Bay and thence spread gradually in a kind of guerilla condition over the whole of Labrador. According to FLAHERTY (265) this still prevailed in late times in the north-western part of the peninsula: the Indians made raids on the defenceless Eskimo who, attracted like themselves by the prospects of the deer, ascended the rivers from Ungava Bay. At that time they had no firearms as had the Indians, but since they also secured these weapons from the trappers they have proved themselves more than a match for their hereditary foes.

Scanty historical information also shows that for a long time a kind of intermittent state of war has prevailed between the Eskimoes south of Hamilton Inlet and the eastern Montagnais. In the interior the Indians were dangerous enemies: they knew the terrain better than the Eskimo, they were numerically superior and had better weapons. But in the archipelago the Eskimo was superior; a single kajak man would lure the Indians to follow him out to an island where a large number of his fellows lay in wait, they took the Indian's canoes away and killed their owners.

The situation of the Eskimo was made worse when the Micmac Indians from the Gaspé peninsula on the south side of the gulf also appeared in their canoes to fight them: yet the Eskimo bravely held their ground till about 1600.

In the Europeans the Eskimo found a new enemy. Almost at once a state of warfare arose between the natives and the French invaders, broken by short, calmer periods. Slowly the Eskimoes were driven out of one position after the other by the *tertius interveniens*, the white man, sometimes in alliance with the Indians. The Eskimoes both on the west and the east sides of the peninsula were compelled to withdraw to the north.

On the coast of Hudson Bay, the so-called East Main, the Eskimo district was taken over by the Indians to some extent after what was presumably a fairly

stubborn resistance (DOBBS, SKINNER). In 1744 the Eskimo still occupied the area north of East Main River (52° 30′). About 1752 they appear to have been forced back to Belchers Island and Sleepers; their southern boundary seems to have lain at Hazard Gulf (56° 22′) according to COATS. If this information is strictly correct the Eskimo must have somewhat extended their hunting grounds again to the south for now the boundary lies at Cape Jones (54° 50′), cf. Fig. 222.

On the south-eastern coast of the peninsula the Eskimo's withdrawal was only slowly completed. The oldest settlement there is thought to have taken place about 1704, when COURTEMANCHE began to colonize his concession which stretched from Khegaska on the Gulf coast up to Kessessasskiou or Hamilton Inlet. The most important branch of industry for the colonists was intensive fishing for which they used both French Canadians and Montagnais Indians. His work was continued after 1717 by his son-in-law BROUAGE who learnt the Eskimo language, sought connections with them and even attracted them to come south to him in the summer in order to barter. But the Eskimo also made use of the opportunity to plunder the white men. The consequence was that the station had to be closed (325) and the feud continued.

— It is curious to note how different were the white men's opinion of the aborigenes of Labrador in olden times. The Jesuit LAURE (556) for example writes in 1720—1730: Effectivement ce sont d'aimable gens [the Indians, Papinachois] pour leur inalterable gayeté. Plut à Dieu qu'ils pussient communiquer de leur temperament à leurs intraitables voisins les Esquimaux qu'on n'aprivoisiera jamais sans miracle parce qu'enfoncés dans leur rochers naturellement creuses et imprenables . . .ils ne se laissent jamais approcher d'aucune nation fut-elle basque, car on ne doute presque plus que quelque basque pecheur naufragé sur ces côtes avec quelque Ève n'ait été leur infortune Adam. The missionary JENS HAVEN writes of his arrival in Newfoundland as late as 1764: everyone here paints the Eskimo in shocking colours. Treacherous, murderous savages, . . . no Eskimo kajak could be tolerated within gun-shot of any European boat, so great was the dread these savages had inspired (205). —

A general anarchic condition seems to have prevailed in the 17th and 18th centuries. The Indians and the white shot and plundered any small group of Eskimoes they caught sight of. On the other hand the Eskimoes used to creep up to the whites in the thick fog and terrify them with their horrible yelling so that they fled, leaving their things behind them. CORTEREAL found a sword among the Eskimo which must have come from Europeans. COURTEMANCHE at the beginning of the 16th century found a gun among them, though they scarcely understood its use. The crews of the trading ships were lured into ambush and killed; the Eskimoes used the weapons of the weak: cunning and terror. This state of things seems to have prevailed for a long time.

For decades the Eskimoes maintained their *jus primo occupantis*. But when the French furnished the Indians with firearms the fortune of war turned. The Eskimoes were soon obliged to retire to Eskimo Island on the Gulf coast where they entrenched themselves. In 1640 a force of Indians and Frenchmen attacked and the island fell to them; thousands of warriors (?!) are said to have taken part in this affair. — On the Atlantic coast on the other hand the Eskimoes seem still

to have lived in undisturbed possession of the district. However scarcely any definite mention of the people there is to be found in the literature until JOHN KNIGHT in 1606 was attacked by 'a very little people, tawnie-coloured, thin or no beards and flat-nosed'.

The information as regards the relations between the Eskimoes and their neighbours is anything but clear, but there are indications that they had become more peaceable at the beginning of the 18th century. The French had at that time (1702) begun to colonize the coast (cf. above). Again, numerous Eskimoes were to be found on the Côte du Nord (the north coast of the Gulf) right away up to Anticosti Island in the west. In 1704 the Eskimoes were, however, a great nuisance to the French stations in Bradore. Trading and mission stations were, in spite of this aggressiveness, opened up farther and farther towards the north-east; finally one factory was established at Blanc Sablon (somewhat earlier than 1733). JEFFREY relates how the French in 1753 were in the habit of buying oil and whalebone from the Eskimoes on the Atlantic Coast; 'the Eskemaux go up to Latitude 58 or further north; there leave their great Boats, pass a small neck of Land taking their canoes with them, and then go into another Water which communicates with Hudson's Streights, carry their Return of Trade into Eskemaux Bay where they live in winter; and the French made considerable Returns to Old France by the whalebone and oil produced from these People.' On a map from 1757 (LVIII) one finds on the southern shore of Hamilton Inlet toward the east of the Narrows the note 'Ance du Batiment' perhaps a trading station. Relations must then have been fairly tolerable between them and the whites. However, HAWKES quotes an old, unknown author: they [the Eskimo] fly from Europeans because they have been maltreated, fired on, and killed, and if they attack and kill Europeans it is only by way of reprisals. The whites had indeed always to be on their guard.

But soon open conflict again became the order of the day. In the track of the French the Montagnais spread to the east and with their united efforts the Eskimoes were driven still further to the north-east. At the Straits of Belle Isle there were still Eskimoes in 1760 in a kind of fortified camp on an island at the west end; but they were soon driven thence by their enemies. CARTWRIGHT in 1765 speaks of a little fort which was said to have been built in Chateau Bay as protection against the Eskimo; PACKARD describes the ruins of Grevill's Fort in Henley Harbour which is probably the same fastness; it was deserted by the French in 1753 and in 1763 was occupied by an English garrison. According to CARPENTER several hundreds of Eskimoes were living round Chateau Bay in 1765, and others lay to the west of it right away to Mingan [?!]. The fact is that in that year 1765 the British Governor PALLISER made some kind of peace and friendship treaty [!] with 400 Eskimoes in Chateau Bay; in this treaty it was distinctly agreed that thenceforth the whites should be forbidden to plunder and murder the Eskimo; it seems therefore that such action had been tolerated under the French. Relatively peaceable conditions seem to have prevailed after the English took possession of the country.

The missionary JENS HAVEN found Eskimoes in Kirpun Bay on Newfoundland as late as 1762. According to CARTWRIGHT in July 1771 there was a habitation

with 32 Eskimoes at Cape Charles; he speaks of other Eskimo dwellings in Chateau Bay 1786, on Huntingdon Island in 1783 and says that the Eskimoes were still often crossing the Straits of Belle Isle

Further, according to him, there were at the end of the 18th century three groups of Eskimoes south of Hamilton Inlet, called (cf. HAWKES): P u t l a v a m i u t (Battle Harbour people), N e t c e t u m i u t (Sandwich Bay, N e t s b u c k' t o k e, people) and A i v i t u m i u t (Rigolet-Hamilton Inlet, I v u k' t o k e, people). It seems also that the Eskimoes lived considerably farther west on the northern shore of the Gulf at that time; JAMES MCKENZIE in 1808 speaks of Eskimo 45 leagues east of Anticosti. About 1800 Eskimoes are said to have been quite numerous on the coastal strip between Battle Harbour and Sandwich Bay.

These scattered items of information scarcely do more than indicate the course of these people's withdrawal from the Gulf coast. Yet one gets a full impression of the variations in the boundary between the Eskimoes and the whites, and that after each collective attack on the former they gave way only to begin again after some time to penetrate their old hunting grounds.

The struggle between the Indians and the Eskimo gradually spread also to the Atlantic coast. Traditions preserved and still to be heard on the spot point to several battle-grounds like Battle Harbour [?], Indian Harbour and Pompus Island in Hamilton Inlet, as well as a few other places at the outermost coast. Yet the Eskimo still sit steadily round Hamilton Inlet and seem even to have somewhat enlarged their area in the forested land beside Lake Melville. It is said that the Naskaupee Indians have endeavoured to drive them out, and according to tradition among the Eskimo there these Indians several times attacked their encampments at Lake Melville. The decisive fight took place on Eskimo Island at the outflow of Lake Melville some time at the end of the 18th century. HOLME reports something like 70 graves on the island which according to »ordinary Eskimo customs» are not deep in the ground. On the same island I found more ruins of four great-family houses and many plundered graves of stone blocks. An Eskimo who accompanied me described on the spot the battle between his people and the attacking Indians, 'hundreds of years ago'. A skull with a bullet hole showed that the attack took place after firearms reached the Indians. The large number of plundered cists containing human bones and bits of birch-bark illustrated the tales that the fight was bloody. The rearguard of the Eskimo retained the place and use it even to-day.

In the south of Hopedale the Indians and Eskimoes sometimes meet, KOHLMEISTER (530) wrote in 1811; the Hopedale Eskimoes seek to cultivate their friendship, quarrels and bloodshed seldom occur. But in Ungava the meetings now and then terminate in murder; the Eskimoes are much afraid of the Indians, who are a more nimble and active race.

I have been unable to find any exhaustive information regarding the development in the 19th century. The southern tribes soon became extinct. Intercourse with the white race proved their ruin. The European clothes and European food no doubt were the principal agents in their destruction. To which must be added also the adoption of European vices and the introduction

of European diseases (325). The southern Eskimoes remained in heathendom to the last. CHAPPEL (144) tells in 1817 of a tribe of about fifty persons that visited the trading establishment near l'Anse-à-Loup. While there a woman died, her female infant was immediately stoned to death and buried with her. In the 1850's FERLAND met three or four Eskimoes at the Gulf coast between Mingan and Khegaska; they lived like the Europeans. Near Blanc Sablon, he says, an Eskimo lived. According to the missionary CARPENTER two Eskimo families were still living about 1860 in the neighbourhood of the mouths of the Eskimo River and the St Augustine River respectively. The widow from the former place married an Englishman; perhaps this was just the John Goddard whom PACKARD met, who lived on a point three miles west of Caribou Island and was said to have married an Eskimo. In 1860 PACKARD saw an Eskimo on Caribou Island off the Gulf coast. On Tub Island in 1864 he met a full-blooded Eskimo woman married to a 'William'; they had adopted a Naskaupee child. The missionary ELSNER reports in 1857 that in Hamilton Inlet there were only 31 families, ten of them Eskimoes. In 1860 MCCLINTOCK (325) stated that there were said to be about 200 people living in Hamilton Inlet, but the Eskimoes who had once been so numerous were fast dying out. He was told that on an island at the mouth of the Inlet a number of skeletons of Eskimoes were strewed about the surface, showing that they had fallen victims at one time to a virulent, contagious disease (cf. p. 472). WALLACE reported in 1905 that only two full-blooded Eskimoes remained south of Hamilton Inlet (994). HAWKES as late as 1914 discovered two Eskimo in Sandwich Bay. In 1937 I saw a grown-up Eskimo girl as a servant in Cartwright, but otherwise I was unable to find any of them south of their present habitat. Their present southern boundary runs along the southern shore of Lake Melville towards the east from the English River and over Back Bay right away to Hamilton Inlet or Ivuktoke Bay, also called Eskimo Bay or Groswater Bay.

The present southern limit of the Labrador Eskimo is also a cultural-historical one. South of this limit the Eskimo had learnt to know the whites as bringers of misfortune —, murder, plundering and epidemics followed in their tracks. But at last a nobler form of the white man's civilization had found its way to the Eskimo from the north. The Moravian Mission came like helpers from above in 1752 to the northern parts of the coast and the Eskimo now met a type of white man hitherto unknown to them. The ruthless exterminating of the Eskimo south of Hamilton Inlet started by the whites and the Indians on the one hand and the loving care which the Moravian missionaries showed for the Eskimo on the other must have stood in sharpest contrast. The white people must have seemed extremely paradoxical to the dark-skinned heathens, more paradoxical than the heathens to the white man.

For reasons already given the most southerly Eskimoes in the world at present live on the sound between Lake Melville and Hamilton Inlet, The Nar-

rows, and they still obtain their livelihood in the main from the traditional hunting; cf. Fig. 223. Their southern boundary is a line running from West Bay, somewhat above 54° N., towards the south-west to the Mealy Mountains. South of this boundary there are a few half-bloods, but they have completely given up their ancestors' way of living and assumed the so-called *livyeres'* (p. 727) habits and customs, these latter now dominating the southern part of the Atlantic coastal strip. Only occasionally can some people of compara-



Fig. 223. The salmon-fishing camp of the most southerly Eskimoes in the world at Lake Melville. On the lower picture the Mealy Mountains are seen in the background. Photo the author, 1937.

tively pure Eskimo blood be seen south of this line. To the north of it again the Eskimoes and the half-bloods, so-called *settlers*, have a small coastal strip which is only crossed by the Naskaupee Indians now and then when they come down to Davis Inlet or Nain to trade with the Hudson's Bay Company.

Within this coastal strip the phenomenon usual among primitive people is repeated, towards the boundaries their numbers are less. The Nain district is almost wholly occupied by Eskimoes and the settlers are an inconsiderable minority, while to the south the number of the latter rapidly increases. On January 1st 1939 there were 106 Eskimoes and 184 settlers in the Hopedale district, but in the Makkovik district were only 5 Eskimoes and 258 settlers; here the number of Eskimoes had diminished very early. Packard in 1864

tells of two Eskimoes living at Strawberry Harbour: formerly a few of them lived in the region south from that place, but they have died off within the past few years; they have gone with the game, banished like it to the arctic regions, maybe also faded away before the better armed Naskaupee Indians. When the Eskimoes disappeared the white half-breeds came in their place.

The Rev. PAUL HETTASCH told me that the boundary to the Eskimo's coherent habitat should to-day be somewhat north of Hopedale; scattered among the Eskimoes are however a few families of white and mixed stock. The Eskimoes who have their huts near this limit, have had so much contact with the mailsteamer that in many respects they have changed their economic life, are becoming Europeanized.

One more interesting fact deserves mention in this connection. While the Eskimo culture has been forced further and further north during recent centuries, a movement in the opposite direction can be noted in the beginning of our century at the northern part of the Atlantic coast; here the Eskimo have begun to drift with their homes farther to the south. The reason is said to be the lack of fuel (!) in the north (603).

Small internal migrations, on the other hand, are usual. Some years there was an abundance of seal and in others they were scarce and inadequate for the settlement's requirements. In 1840, for instance, the Eskimoes began to desert the coast north of Hebron and went to Ungava. The Nachvak people had expressly pointed out to the Mission that if they had to leave their own country they would starve, the probability of which could not be denied.

The means of livelihood.

Although the climate is hard and the country apparently so inhospitable, the supply of game both in the sea and on the land, seal and caribou, and later fish and fur-bearing animals, has made it comparatively easy for the Eskimoes in Newfoundland-Labrador to get their living. The main supplies of the sea are different seals, small white whale, dolphins, and walrus, with fish such as cod of different kinds, salmon, and sea-trout. The seals provide the Eskimo not only with their main food but also their clothing.

No less than five kinds of seal together with the white whale and the walrus are hunted. The ordinary seal — *netceq* — has always been his main food and it occurs near the coast at all periods of the year, in summer in the bays and in winter it is caught in the breathing-hole or out on the ice-edge, *sinâ*, where the winter-ice pack meets the coastal-ice belt (p. 426). The ranger, the only seal which lives in fresh water, provides a highly valued, spotted skin. The jar-seal is the most usual on the coast, its flesh is appetizing food and the skin is

used for clothes, boot-legs, sacks, and formerly was used to cover the tents, sometimes also to cover the kajak. The bearded or big seal is next to the walrus in size and is common on the coast; the skin is strong and is used for boot-soles, drag lines and dog harness, and formerly also covered the umiak, the big skin boat, if there was no walrus skin at hand. The harp or Greenland seal is to be found in early spring in enormous numbers on the pack-ice; its skin is used for boots and other leather articles, also for the kajak and the tent. The hood, the next largest seal, generally visits the coast north of Nain at the beginning of May, but only in small numbers. Towards the north at the coast the catch of seal and white whale increases in importance.

Since time immemorial the caribou has been a constant object of hunting both for its skin and its flesh. The flesh of the black bear is also valued.

The trapping of fur-bearing animals on the other hand is a comparatively new source of earning among the Eskimo. It became a regular source of income only after the price of furs began to rise.

Catching cod with the 'jiggar' is really also new among the Eskimo during late summer, for cod-fishery became more extensive only after it had found a market here in the north, e.g. salted cod. Before there was a market for fish the people hunted only the seal, walrus and the black and the white bear.

These are the creatures on which the people of the coast, Eskimo and settler alike, depend for their food, and not only for their own food but also that of their dogs (319). The food of the season may fail, stormy waters or unsafe ice hinder the search for seal, soft snow makes travel for men and dogs toilsome and slow in the caribou lands, blizzards may stop all travel; even if fur-trapping brings in money to these folk, these hardy hunters can never be at their best on bought foods like flour and biscuits. The people must have meat, fresh or *nipko* [dried seal meat], for their well-being. The missionaries have therefore taught them to set aside something for the days of scarcity (478).

Hunting and fishing have always been seasonal occupations: seal in the springtime among the breaking ice, trout and codfish in the summer, seal again in the stormy waters of the autumn, and seal and occasionally walrus when the sea has frozen and the hunters can go to the edge of the ice with their harpoons and their skin canoes. In ordinary years there is always hunting of one sort or another; no sooner is one hunting season over than another begins, sometimes two sorts at a time. There is very little idleness in an Eskimo hunter's life (476).

Primitive folk's ways of living usually react very sensibly to every variation of the surrounding natural resources and to the possibilities to utilize them. In Labrador the industry of the Eskimo has had time enough to develop into

correspondence to the conditions of their habitat and the possibilities to make use of the available resources. The pattern of their occupations therefore varies somewhat. This variation in the annual cycle of the Eskimo on the Atlantic coast can best be outlined by three examples: the cycle of the Eskimoes of Hopedale, of Nain, and of Ungava. As the Nain people's way of living corresponds more nearly to the habits of olden days than the others we shall begin with it. We will in the main follow Dr Hutton's descriptions and the Rev. Hettasch's and my pilot Julius Nathanael's tales.

Working life of the Nainemiut, the folk of Nain.

Spring.

The *sinâ* has begun to break up and the seal hunt of the spring is finished. But the people still lie in their camps on the sound where the seal can be caught in the spring. The women fetch wood and water; they also bring home the game necessary for food, for the men do not trouble to bring it by dogs except when the distance is great. The women skin the seals, tan and soften the hide; then they make clothes and footwear of it. The men, on the other hand, after the hunt spend a great part of their lives in the camp eating, sleeping, and smoking. It is a custom preserved from the days of the purely hunting nomadism when, according to their idea, only the hunting of seal and wild reindeer was a worthy occupation for the men. Yet during the hunting season the men also are constantly on the move.

The spring has finally come in the air, the snow melts, the bay ice begins to crack. It is time to return to the mission station. But the spring flitting must be carried out while travelling is safe and easy. The air is warm by day and the snow slushy, the nights are chilly and the snow is then covered by an icy crust; so the Eskimo family starts early in the first light of the rising sun, the sledge heavily loaded. Under the warmth of the May sun the dogs will be tired if one does not start early; Fig. 224 (476).

The station is home. But do not forget this is a tribe of wandering hunters. Some families are nearly always on the move. They take trips into the inner bays to catch rock-cod for dog's food and to be nearer the firewood. Some people again have gone seal-hunting among the breaking ice, waiting for the return of the harp seal from the south. This seal disappears only with the pack ice, and after that the Eskimo is compelled to hunt the other seals. They shoot them when they have whelped on the sandy banks of some river mouths or in some bays.

The early part of June is the dreariest time of the whole year: one is shut in, no sledge, no boat, the water is packed close with floating ice, the snow

is softening. One waits for the ice to float away and leave the water clear for navigation. Now, the people have returned to the village. The men mend and make nets for the autumn seal-hunt. The boys teach puppies to haul the sledges (478).

Summer.

The summer brings the halcyon days, it is possible to drift about in a boat among the islands, pitch one's tent on one of them and enjoy, as only a child



Fig. 224. Sledge dog team. To the right the Rev. Paul Hettasch at Nain (205).

of nature can do, freedom from care in the magnificence and beauty of his home surroundings. Some families have already erected small huts on the islands or in the bays, Fig. 225. With that the custom of having a settled summer home is growing up. Yet many of them still live in tents which are moved from place to place so long as the summer fishing lasts; cf. Fig. 226.

Not all the families that flit in the springtime go seal hunting. Some Eskimo travel along the coasts and collect the eggs and down of the water birds. These eggs are saved until they have a specially 'high' taste, and play their part at the winter festivals as a great delicacy. Puffins and guillemot are caught in the summer with nets and preserved in fat for the winter, it is said.

Sea-trout fishing.

Some families take their nets to the haunts of the sea-trout. In the early summer, when the ice has broken up and disappeared, the trout come down to the sea from their winter home in the fresh-water ponds of the far interior, and after a short time in the salt water they become fat, so the fishing mainly begins in July. Fishing for sea-trout has prevailed among the Labrador Eskimoes since ancient times, but it is believed they did not then know the use



Fig. 225. An Eskimo summer dwelling at Port Manvers and its 'mount guard' (lower picture). Photo the author, Aug. 1939.

of nets; they erected a stone barricade across the mouths of the rivers in which the fat trout went in with the tide and when the pool thus obtained dried up with the ebb, they speared or took up the fish with their hands. This method of catching is now forbidden and, as the Eskimo is very law-abiding, he now uses nets spread out in the shallow water where the big rivers enter the sea. The catch of trout continues as long as they remain in the bays, until the middle of August or a little later. As far as money goes trout-fishing is more profitable than seal-hunting; it is always fairly certain and salted trout always fetches a good price at the store. It is the women who split and salt the

trout. The catch can be large, many barrels or so (476). The Eskimo also dry the fat trout for winter food and then call it *pepsi.*

In olden days the sea-trout was taken by spearing under the ice (530).

Cod-fishing.

In July, when the cod fish throng the deep channels among the islands, the Eskimo goes afishing. A good season not only pays the debts which the



Fig. 226. Eskimo camp at Ryan's Bay. Photo the Forbes-Grenfell Expedition, Aug. 1931.

family has piled up at the store during the winter and spring, but gives him new tools, guns etc. Therefore the news of cod — *oggak* — in the bay will send many people post-haste to the fishing; very few stay at home, though there are of course a few thriftless people among them who linger in the village long after the beginning of the work. In the months of August and September this occupation keeps them busy and the whole of Labrador smells of fish. Yet the cod shoal never stays at the same place and he must find out where it goes and follow it in his boat. The Eskimo is a wonderfully

strong oarsman; he can row for hours without resting; he knows too how to make his boat travel quickly by short, sharp strokes of the oars. He has all the grit and simple perseverance of the trained fisher and hunter (475).

He will at last find the right place, and here the fishing begins with a *'jiggar'*: a bright piece of lead shaped like a little fish and armed with two barbed hooks. The patient jerk-jerk-jerk of the arm goes on for hours and the cod-fish tries to swallow the jiggar before him and is caught. Thus the fisherman jerks his jiggar up and down, and if he has success pulls up fish in goodly numbers. But on bad days he may 'jig' for hours, moving his boat from place to place in search of a shoal of fish, without a catch. In stormy weather he has to remain at home (475).

Often the shoals of cod come into the bay near the mission station as in 1939, and if the fish is biting well, the bay will soon be dotted with boats, in every boat one or two men are jigging. They stay on the water for hours. But, even in the bays the sea can be high enough to swamp a boat, and in water at only two or three degrees above freezing point a swim is an utter impossibility. Therefore, when the spray comes whipping along with the rising wind the fishermen take warning and head for the shore. And though there are no finer boatmen in the world than the Labrador Eskimo, they have thought many times that their time had come, HUTTON stated.

Day after day men and boys 'jig' from morning to night. Patiently they jerk the bright leaden lure up and down within a couple of meters of the sea bottom. There are times when the fish is so plentiful that they are on the hook before it is well sunk. The jigging is done only by the men and boys, the catch is given the women and girls for splitting and salting. They take much care in the drying of the fish on the racks; they scurry when a sudden shower of rain comes and threatens the half-dry fish.

The quantity of codfish in the sea is here astonishingly great, they must teem in myriads along the coast; year after year not only Eskimoes but hundreds of schooner crews gather the fish by tons and year after year the fish is there again quite as plentiful as ever.

During the summer months the mission settlements are almost deserted as nearly all the able-bodied inhabitants are away at their fishing camps. Some families live scattered along the shores of the bays and runs. Some have a few little huts there (and earlier *igloos*), whither they return year after year. But most of the people live in tents which they pitch on some little island. At heart they are wanderers, Dr HUTTON wrote, restless beings following the call of their hunting and making a temporary home where their work is. The Eskimo is very industrious at this time; my experience is that it is no

easy matter to get a guide when the codfish has been seen in the bay, everybody is busy.

At the end of September the main rush of the codfish is over. When the autumn days come the codfish is moving away to the deeper water and jigging is giving little result. Many of the people then make their way home with their great bundles of fish and mend the seal nets.

When the summer fishing comes to an end, not a few of the Eskimoes remain away at their camps till near Christmas, when they can return with their dog teams over the sea-ice which is always strong enough some weeks earlier. The Eskimo now spends his days on the water looking for seals. He goes out to the various hunting-places. Hour after hour he sits like a man of stone waiting for the wary seal. The kajak has been an excellent craft for this work, easy to turn any way and riding the waves like a cork, but steady because the hunter sat low.

When they were away at their seal, trout and cod fishing places the village was almost deserted; the savage mother-dogs nursing their litters of puppies under the doorsteps are the only signs of life. When the sea freezes the people begin to make their way home to the village.

Caribou-hunting in bygone time.

In former times before the Eskimo began cod-fishing they used in July to move with their whole families to the heads of the fiords, there they left the old ones, the women and children while the hunters went into the land to hunt *tuktu,* caribou, in August and September. Four of the Eskimoes went up the country from Saglek on July 4th 1811 to hunt caribou, Kohlmeister (530) writes. Farther inland in Tessiujak fiord there is a place name which still bears witness to this: Ittukorviak (= 'the place where the old ones are left'). But at that time there were feuds between the Eskimo and the Indians and the former never ventured far beyond the heads of the bays, so the result of the hunt was probably limited.

This custom is no longer known and only a few individuals make their way in summer to the interior to hunt caribou when they are tired of a fish diet. In our days the caribou is hunted chiefly at the end of April and the beginning of May, — curiously enough just at the time when the flesh and skin of the animal begin to be less good. The reason must be that the possibilities of communications are just then at their best, for all the brushwood in the river valleys lies under snow. Yet some hunters pursue the caribou also during the

fox-hunting period in late autumn and winter; then *tunnu*, the suet of the caribou's back, is a favourite tit-bit of the Eskimo.

Autumn.

Seal-hunting.

Formerly as at present, the hunting was chiefly concentrated around the seal, as already stated. The Eskimo must have seal to keep well. Still to-day the seal is of integral importance for the people in Nain; a winter without seals means that the Eskimo must give up some of his hungry dogs. Without dogs he can neither go to the ice-edge nor fetch firewood; he can have no boots, no clothing, no meat, no blubber. The seal seems to have learnt to go northward rather than stay in the neighbourhood of the Eskimo villages, and nowadays they do no more than pass by in the autumn and the spring. Added to that seal-hunting is his greatest sport. Never shall I forget a boy who nudged me in the back and whispered: *puije!* (= a seal), his face grown tense and eager. It is not easy to discover the animal. He looks just like one of the rocks close by. The mimicry is perfect in the autumn, an imitation of the black boulders with their coating of ice (476).

To better understand the seal-hunting it is may be of interest to give some information here about the biological habits of the principal game, the harp (cf. 45 a).

Late in the autumn the harp comes from Melville Sound, and from even more northerly waters during November to February, going southward. About the first of March they bring forth their young on the ice-floes drifting south off the coast as far as the Magdalen Islands in the Gulf of St. Lawrence. For this they herd together in enormous groups on the floating ice. The young are almost all born on the same day. Absolutely unable to escape, from 150,000—500,000 animals gathered in these herds are killed by the Newfoundlanders. The young, the »*white coats*», have an exquisite fur (364). The mother at last forces the remaining pups to take to the water, a mysterious instinct at once teaches them to go north, and by the end of May these 'beating seals' have mostly passed along the Labrador coast. The next winter the 'beater seals' return south again as 'bed-lamers', the second winter as 'young harps', in the fourth year having the dignity of 'old harps'.

The harps which have escaped slaughter by the Newfoundlanders are still not safe in the north. In May and June huge frame nets enclosing a great space are put out from a capstan on the land, all along the shores, and when the harp enters them the net is raised on to the land. The Eskimo catch the harp in ordinary seal nets. Also the harps are shot as they noiselessly rise into

the fissures between the pans to take breath. The dead seal floats for a short time at this period of the year, and the body must quickly be hauled up on the ice.

The last weeks before the definite freezing of the sea are a busy time in the villages: seal-hunting is beginning.

The Eskimo move out to the islands where the seals collect in the channels with a strong current which do not freeze so soon. The hunter has noticed the places where the seal has a habit of diving and there his net is drawn along the bottom across the channel. In the beginning of the century, there was no lack of nets. From the middle of October the season may be said to have begun for seal-hunting. Then herds of Greenland seal appear, first the young ones and then the old.

The Eskimo will avoid competition in hunting. Therefore he often goes to the seemingly most unpromising places, near the restless Atlantic. Many of the places are pictures of utter desolation, like the Salomon Island which rises steeply from the sea, and is surrounded by mere jagged reefs sticking out of the foam in the shelter of which the seal loves to swim. However, my friend Julius's minute sealing-cabin nestles there among the rocks. Where the coast is broken by swarms of tiny islands there it is especially good to put out the ground nets. We must agree with Dr HUTTON, that such places, to us Europeans no more than a picture of grandeur, looks different to Eskimo eyes.

In older times harp-hunting used to begin on the first autumn ice in the fiords, Dr HUTTON reports: Strong winds had cooled the surface water for some weeks, the west wind died down somewhat, the cold increased, the sky was clear, and finally one morning the water was no more to be seen because of the frost mist. Everyone knew that the fiord was freezing, and that now the seal was moving to the channels and the bays, and the hunters started out. First the animals went to certain places in the bays; when these were blocked by the ice from the rivers and froze with the increasing cold, the seal moved on to the channels kept open by the strong currents and there herds of the Greenland seal would remain. There the hunter crept out on the ice only twenty-four hours old, harpooned or shot the animal and dragged it up on the ice. Under favourable conditions each hunter could average ten to twenty seals. And twenty seals amply provided for a small family for the whole winter. This life suited the Eskimo well.

A curious method of hunting the Greenland seal still prevails in cold winters. The animal remains in some places along the shore and the narrows where the battling currents give the ice no chance to set even in the bitter cold of January.

Then when the channels finally begin to freeze the seal climbs up on the ice and begins to creep towards the sea. They sometimes mistake the woods for the open water, get lost in the woods, and there are surprised by the tree-fellers and killed. On the ice the Greenland seal moves so quickly that the hunter must run in pursuing it. Sometimes a whole herd of seal will come up in the last open hole: in Hopedale some years ago about twenty large Greenland seal were taken with an axe out of a single ice-hole.

In modern times, however, nets must be the order of the hunt before the sea freezes, nets stretched along the sea-bed in some favourite channel or inlet. They will lie there over night while the hunter waits in a smoky hut till morning when the nets will be hauled in. The bay seals especially are captured in nets anchored to the bottom; they will soon be drowned as they cannot rise to breathe. Sometimes they too travel like the harp long distances over land. In winter they move out to islands in the open where the sea does not freeze soon. It is a cold job, ropes and nets are frozen and the heavy seals are stiff and dead. Sometimes the hunters have to pile up a sort of stockade of seals taken from the nets.

For a fortnight the hunters are busy with their nets. But the sea freezes, and the nets freeze with it and they have the awkward job of hacking them out. In the middle of November the Okkak Bay begins to freeze at the edges. After a fortnight the bays freeze and when the *'sikko'* (= ice) covers the sea, the seals are away to their winter haunts at the edge of the ocean ice (476).

— The use of seal nets was probably introduced among the Eskimo by the white people. CARTWRIGHT mentions them as early as the 1770's (134): in the south-eastern part of the peninsula the seal nets must be out by November 20th. The length of the sealing seems to have depended upon the temperature conditions; when the anchor ice, or 'lolly' (p. 270), began to form the nets must be taken in, he reports. —

There are of course many variations in the normal habits connected with the supply of seal or the weather conditions. For instance if it is very cold and masses of snow fall early the time is not favourable for seal-hunting. If the store of food is running low the hunters must first devote themselves to hunting caribou in the interior. Yet of late years seal-hunting has been neglected in the autumn because of the lack of nets. When the Moravian Mission managed the trade with the Eskimoes its people used to lend them nets, but since the Hudson's Bay Company took over the trade, although the Brethren in England have collected money to procure seal nets for the Eskimo, it has not been nearly sufficient, and they now seem to be so poor that they cannot afford to buy nets, for they cost several hundred dollars. The seal nets used in

the autumn are enormous, 3.5 by 50 fathoms, with a fish-chest. It is heavy, costly equipment and was therefore often owned by a group of Eskimoes who used it together. Formerly it was said that a catch of two to three hundred seals per net could be expected in the autumn season. The co-operative principle was even in olden times not unknown among these people. If one had a seal net he often lent it to one of the younger men and shared with him the resulting catch. Dogs, too, were lent to a neighbour, the owner getting a couple of logs or other firewood in payment (475).

In November when the sea is freezing and the snow begins to drift upon the land the hunters live rather quietly in their tents or huts mending their nets (476). A large number of the people even to-day pass the late autumn and early winter in the bays as already mentioned and beside the channels employed in this kind of hunting and catching seal until the water has completely frozen some time before Christmas. Then they get their sledges ready and a few days before Christmas the hunters return with their families to their winter homes in the mission village.

Some of the booty is carried home on dog-sledges and divided among the families of the hunters, being used at once for food and clothes. Another part is left upon the ice as the hunters' personal property to lure the foxes, and is laid out in traps with good results.

A few of the hunters at this time have visited the inner parts of the fiords or the lakes to catch foxes. But even they generally make their way to Nain before Christmas in order to celebrate the holy-days. By the middle of December the village looks fairly busy (476).

Winter.

Home for Christmas is the great idea! Now begins a large influx of visitors. It is a cheerful sight to see the scores on scores of brown faces shining with good food, their bright eyes twinkling with pleasure, Dr. HUTTON relates. The excitement grows and grows, culminating on Christmas Eve.

Work at the station.

But life in Labrador does not lend itself to fastidiousness. The Eskimoes work hard in general.

Only on stormy days when they can do nothing out-of-doors do the men sit at home smoking and talking, making and mending nets, dog's harness, dog-whips, sledges etc. Earlier some of them used to carve ivory, but now this is

practically a lost art among the Nainemiuts; walrus tusks are scarce since this animal has been scared away to the north; also time is more precious nowadays and the market not good, so the young men of to-day do not bother to learn to carve in ivory (476). Instead the father teaches the boys all a hunter's tricks and dreams of a day when the boy has grown up into a handy and clever hunter and can be the stay and companion of his father's old age. The boys under their fathers proper supervision are occupied with the puppies, teaching them to draw the *koma'tik* (=the sledge); cf. Fig. 224 With an indescribable sweep of the arm even the small boys learn to send the thirty feet of walrus hide lash hissing through the air, and with a sharp flick catch a disobedient dog. He drives about with the sledge and dogs and fetches firewood or helps at the chopping. They are as full of fun and mischief as it is possible for a boy to be (475). On stormy days the children also make baskets.

The Eskimo housewife spends the day working in the dull light of the hut at the seal that her husband brings home. She cuts and stitches with neatness. She has to scrape the skins, cut out, chew the leather to soften it, stitch and mend. Eskimo teeth are made for chewing, and the chewing of the boot-leather is women's work from one end of life to the other, HUTTON states. She makes boots and clothing for the family. The art is passing but the skill is still there and only needs rousing. The sure eye is still seen in the fact that the bootmaker with her eyes only can judge the size required by her customer, she has no need to use a measure. It is a surprise to see the teeth of the women often worn almost to the gums. This is due to the fact that when making long boots they are obliged to chew thoroughly the edges of the sealskin to prepare it for the needle. It is also the wife's horrid duty to chew the boots into comfort for the husband's feet if they have become hard and stiff with wear and salt water (761).

The mother has until most recent years cut and sewn all the clothing for the whole family. The clothing of the bigger ones descends to the smaller ones in turn, so that from one cause or another the peculiarities in the cut of the father's clothes reappear in the rest of the family wardrobe; it is the inherent tendency to imitate. — Besides this the housewife has to scrub the floors, — floor-washing is an established custom in most of the houses — and the wood-chopping for the stove also belongs to her business (476). The old widows become 'blubber women': they are employed to cut up the seal blubber and boil it: also to clean the eiderdown.

The growing daughter is the most useful member of an Eskimo family: she minds the babies, she chews the leather and scrubs the floor: she goes out fishing; she also fetches the water, or in winter she fetches large lumps of ice in a bag and thaws them for drinking water.

Caribou and fox-hunting.

But shortly after the holiday and the celebration the hunters again disappear from the stations. Most of them go off on their dog-sledges over the fiords and up the valleys: they go partly to hunt the fox in the valleys themselves and partly to hunt the caribou in the surrounding tracts (1018).

These hunts may be repeated several times in the same winter, and in between them the hunters stay with their families at the stations and gorge upon the spoil they have brought home.

The real fox-hunting season does not begin till after the New Year. Some of the families who have not stayed there all through the festive period, then return to the bays where they hunted seal in the autumn. Then they proceed to set out their traps. With the same object in view some families move to the farthest islands where they have small huts sometimes also used when netting the seals in autumn and to which the foxes have been drawn by the seal carcases left there. As the days become longer, especially in February, a few hunters — not the worst — go off to the plateau in the interior where they kill caribou to be used as bait for the foxes. These hunters stay in the interior till the dogs' food begins to run low and then must be fetched from the autumn stores. Soon the white fox comes; it generally follows the caribou herd to eat up the remains of the meals of the wolves which always pursue the caribou. The fox-hunting season finishes on March 15th and April 15th for the coloured and white fox respectively. The white fox, however, also comes down from the north with the drift-ice which gradually freezes on to the ice-edge along the coast; thence he wanders over to the farther islands and there he is trapped. But on the ice-edge also the fox is caught. When the Eskimo discovers the tracks on the *sinâ* he knows the fox has come down from Baffin Land to feast on the remains of the seals left on the ice-edge; he follows them with his dogs, lays out his traps, or even shoots this highly valued fur-bearing animal; in 1921 no less than 1100 white and black fox-skins were sold, the wearers having been caught in this fashion. For the rest it may be said that the Eskimo takes anything of nature's store which can be of use to his way of living.

In our days trapping is of great importance to the Eskimo. A night's trapping can make a poor man rich at a single bound. Moreover the trapping suits him. The best trapping places are pieces of broken land dotted with stunted trees and hidden behind the hills. Here he sets his fox-traps.

During the long winter the men are seldom idle, they are mostly absent from their homes. There is always the strenuous work of log-chopping to satisfy the big need for fire-wood.

Seal-hunting.

As the sun rises higher in the sky and the hard frozen snow cover is formed by the wind in the later part of the winter, the Eskimo packs his family, his kajak, and his necessary household utensils on to a 'komatik'; the dogs are

harnessed and off they tear at a furious pace to the distant islands, there to pitch camp.

Now the early spring seal-hunting begins! From the camp the trappers make their way to the edge of the ocean ice, the *sinâ*, where the seals sport in the chilly water or clamber up on the ice to rest. Hunting the seal and the fast dwindling walrus can begin as early as February. But it is in May, when these animals and the polar bear are making their way north again, that they can be most successfully hunted. And this has been the Eskimo's favourite occupation. From Nain the hunters often drive thirty miles over the vast barrier of islands to the ice-edge of the open sea to catch seals. The keener men stay among the lumps and hummocks and hollows of the sinâ for some days: sleep all night, hunt all day. The stolid hunter does not know what danger is, climbing on to a floating pan of ice he paddles away with his hands to fetch his seal. The clear calm days are real days for the sinâ. The hunter tries to find the seals' 'blow-holes' where it comes to breathe. With an inherited, unlimited patience he stands at the hole ready for the animal's next visit, and with a shot from his gun or by a flash of the harpoon sunk in its fat neck its fate is sealed. A skilful and strong hunter takes it up simply by the tail. He hauls his catch on to the ice, cuts a hole in the neck and takes his drink of blood (761).

Another kind of seal-hunting is the *otok*-hunting. An otok is a seal that basks upon the ice in the warm spring sun, and lies for hours as motionless as a log. No sooner does the Eskimo see an otok than he arms himself with a protecting shield of white cloth and crawls along as cautiously as possible so that the otok never notices the slowly-moving body before it is near enough to let drive with the deadly rifle. The old method was to creep up to an otok-netsek with a harpoon without any protection by lying flat down and waving a foot to represent a seal; then the hunter used also to cover himself with a seal's skin and imitated the animal's movements.

The gray seal, too, the largest of all Labrador seals, is shot as it plays along the ice edge, but occasionally is caught in sunken nets. Yet by far the best fortune is to catch sight of a clumsy walrus — *aivek* — resting on the ice, and to rush boldly upon the formidable, apathetic beast and shoot it while it is too dazed to move. The walrus belongs to the outermost belt of the coast, and when the new ice forms at the sinâ, it creeps up on it. Thither the hunters also make their way, but only the boldest. For if a ground swell comes suddenly and the covering of new ice begins to bend and curve then one needs every bit of skill and speed to save oneself; often in such a case the game has to be left behind. It was the Okkak people who gave birth to the boldest and

most skilful walrus-hunters. The walrus is an enormous lump, fifteen feet long and fourteen feet round the middle, weighing some 2500 pounds. An old Eskimo custom was to cut it up at the sinâ, because it was too heavy a load; every one who has seen the capture has to have a share. The capture of a walrus meant for the Eskimo: meat, clothing, footwear, light, house, boat, nets, and oilskin jumper for the rainy season. The ivory of the tusks was of great value.

To-day opinions differ as to the walrus and its importance to the Eskimo. Those best acquainted with local conditions seem to believe that this animal is about as plentiful, or perhaps more correctly as scarce, now as it was in the time of the older generations. From what the Rev. Paul Hettasch told me, the walrus is not now so important, because it is scarce and difficult to catch. This is also true of the white whale.

When on sinâ hunts the Eskimoes are in the greatest good humour. One remembers what John Davis wrote of them in the 16th century (210): They are never out of the water, but live in the nature of fishes. And this was described at the end of the 19th century in the following words: Evolution and environment have produced a type of human being which has actually some points of resemblance to the animals upon which it principally subsists (325).

As the spring passes and the ice breaks the Eskimo chase the seal among the floating ice pans; boats are needed and speed is necessary, the seal has lost its winter coat of fat and sinks as soon as it is dead. He must act immediately when a seal's head pops up.

The old style hunting in kayaks with their ingenious walrus-tusk harpoons, one of the most marvellous weapons of primitive man, is nowadays still in use only in the northern parts of the peninsula. In our days the hunter prefers guns to harpoons. The picturesque is gone, the rifle makes the hunt so much easier. But it has at the same time been disadvantageous: many of the killed seals sink immediately, especially in the spring, and the detonation chases the animals away, and they go to the far north, where they can fish and gambol unmolested (476).

The danger of hunting on the sinâ can even take the hunter by surprise. It sometimes happens that, engrossed in his watch for seals, he fails to notice that the ice on which he is waiting has broken away from the main ice-field and is drifting out to sea before the wind. The off-shore wind freshens as the day wears on, a wide strip of water opens between him and the shore, the block is swept out to sea in the grip of the gale, the current too is strong and finally the land is no more than a low, blue strip. The sledge and dogs are with him,

he has seal-meat and will not starve, the snow upon the ice will serve to quench his thirst. He is moving farther and farther in waters where at that time of the year there is no hope at all of any ship. The hunter has only to be reconciled to his fate: to be lost by the breaking or foundering of his ice-pan. But it also happens that the wind changes and the floating island turns onshore. It happened thus for those Nain men who were adrift for fourteen days on a pan of ice, but landed near Hopedale, 100 miles to the south, safe and sound. GRENFELL describes still longer journeys on an ice pan. Seldom does it happen on this coast that an Eskimo loses his life in this way (478).

Early spring.

At Easter the Eskimo visits his village again. It is good travelling time, the ice is sound and the days long. But he will stay there only for a short time.

Caribou-hunting.

When the sealing at the sinâ and trapping in the woods come to an end, the »*tuktu*», the caribou, occupies their thoughts. Custom had fixed Easter Tuesday as the day at Okkak for the beginning of the reindeer hunt, the great event of the hunter's year; it is late but no Eskimo would cut the religious services to go a-hunting. Year by year the same start (476). In the other villages one was more liberal. When the news comes that the caribou have been seen great excitement prevails. There is stir and bustle all day long preparing for the journey up the frozen bays and rivers westward to the moss-covered plateau where the animals are pasturing. The hunters start out together but soon separate. One or two stay in solitary snow-huts whence they go in search of the deer. Sometimes, if the weather is stormy and there are many snowdrifts, they remain there for weeks (1018).

— The Eskimo hunts where he chooses. In contrast to the Indian he has never had any family-controlled hunting-ground; the sea is the most important and that is open to all. This is equally true of the caribou hunting-ground in the interior, he thinks. He has therefore never a thought of singling out any special hunting area, for to him the wild game belongs to society as a whole. His ethics prompt him to give way rather than to quarrel on account of it. On the other hand when caught the game is shared out according to complicated rules. In consequence the abodes of the hunters often move, one summer they are here, another there. —

At the beginning of this century the caribou was still being generally hunted near Nachvak and Saglek, Nain and Davis Inlet, where small, more or

less stationary herds of about 70 used to appear. But then the hunter never went far inland — never beyond a certain distance — their limit was that of half the quantity of dogs' food they could carry with them, they had to retain enough for the return journey in case they killed no game. The best dogs' food is seal flesh or caplin; a coarse paste of oatmeal is kept as emergency food (761). The large cache of dried or frozen caribou meat which the old folks talk about belongs to history; the frozen meat was eaten raw, but the dried meat was soaked and then boiled.

The small herds mentioned above seem to appear no longer in the neighbourhood of the coast, and the hunter must now seek out solitary or small parties of caribou.

The hunters follow the tracks and circle the herd so as to come upon it from the lee side; they know by the freshness of the tracks where approximately the herd is to be found. The dogs shall not come too close to the deer, they become wolves again, keen to do a little hunting for themselves. When they see the gray spots on the hill-side digging with their forefeet at the moss the Eskimo turns the sledges upside down and makes the team of wolfish dogs lie down; they cannot drag the upturned sledge. The hunters approach the herd, in May the cows have their little calves beside them. When he shoots the cow, the calf will not go away, it is killed too. Finally they can proudly return to the home village with the sledges piled with meat and skins.

The Eskimo seems always to be on the track of one sort of animal or another. He shoots many black bears too.

A stray white bear, *nanok,* sometimes comes along the coast with the ice sailing southward on driving ice-pans, competing with the Eskimo for the seal. It becomes the object of a furious hunt. But most of the polar bears have now retreated to desolate spots in the north where there is no smell of man. Sometimes a polar bear has been caught without guns or spear. The Eskimoes fell to their oars and got the boat between the bear and the shore so as to head him off. Then they chased him to and fro until he began to tire, and then they assailed him with their oars, hammering prodigeously at his head until they had him stunned and helpless and so could tow his carcase ashore.

Seal-hunting.

When the spring has advanced so far that the ice-edge begins to break up, some Eskimoes begin to manoeuvre their way back to their Islands on the last pieces of ice.

But when the ice at the sinâ begins to break up the Greenland seal comes back to the bays, and after a time again goes out to sea. Many Eskimo catches

them during this visit with the net and gorges on the flesh; however, the seal is then very thin and may sink if it is shot.

When the drift-ice comes to an end in the last days of June, or perhaps not until the middle of July, this harp seal withdraws to the north. Now the family hurries back to the mission station, the fixed pole in their yearly round, and usually they have with them plenty of game. Then the Eskimo has to be satisfied with hooded seal, bearded seal, ringed seal, and ranger. They shoot them when they give birth to their young in the sandy river mouths or anywhere in the bays.

The spring seal hunt brings the Eskimo's hunting year to a close.

A retrospect. The metamorphosis.

From all this we must conclude that the annual cycle as a whole and all its divisions are extremely well balanced in relation to the produce of surrounding districts and nature's rhythm. If he follows it, the Eskimo can manage quite well by himself without any food supply from foreign countries. Dr HUTTON for instance reminds us that the waves of the World War 1914—18 reached the shores of Labrador only in faint ripples. Fishing and seal-hunting went on as usual, the people set their fox traps in the ordinary way. But the market was disturbed with the rest of things and there was not only the difficulty of getting the goods to market but also of selling them. Food and fishing became troublesome for the white people, but the Eskimo lived well. More than ever Labrador became a little world of its own.

But sometimes the seal-hunting is a failure and hard times come to the little community. Then even the Eskimo can see the shadow of famine rise. In these conditions the hunters' generosity appears, HUTTON says; his catch he hands over to the old people of the village and goes to hunt caribou. The neighbouring villages give friendly help, sending blubber and meat during the bitter days, and some skin for boots and clothing. This is why the Eskimo hunting people never starve to death like their neighbours, the Naskaupee Indians, they are always neighbourly enough to find food for one another and for the worst days. When there is sickness in the camp it may happen that a dog must be killed to make a meal for the rest. Especially in the springtime, when the caribou have gone and the seals have not yet come the dog food is often very scanty, sometimes old bed-skins are chopped up for dog food and moistened with a little rank oil. The Eskimo say that over-feeding makes the dogs savage!

Since olden times the ways of living have been almost the same as that just pictured. REICHEL describes the ways of the Eskimo living at this Moravian Mission station in the middle of last century (787 a), and this is given here as a short review of the main lines of the annual cycle:

The New Year finds the Eskimo flocks assembled in their winter huts at the mission stations; at this time the attendance at school and church is the best, and the spiritual work goes on regularly. The chief occupation is the capture of the ptarmigan and fox. For the latter traps are used, which are often placed at a great distance from home and must be visited daily for fear of the bait and catch being carried off by wolves. At this season both men and women are employed by the Mission to cleave wood and clear away snow, for which they receive payment. In February, many of them go in sledges to the ice-edge along the sea-shore, where they catch seals in their kayaks, if they meet with open water, carrying with them in general, besides their gun, a telescope to discover the seal at a distance. Towards Easter the boats are repaired or new ones built. During Passion week all make a point of assembling at the stations. After Easter they usually go inland to hunt reindeer, especially from the northern stations, where the deer abound more than in the south. At the end of June eggs are gathered on the islands and the fishing season commences; this lasts till September, when the haddocks are taken. Salmon and salmon-trout are salted for winter consumption. In October the Eskimo repair to the mission stations for nets to catch seals, and remain in the bays in general till Christmas. This is the chief season for taking the seal: at times they are cut off from the sea by the sudden formation of ice in the bays, and then they can be shot in greater numbers.

Cf. also KOCH (528).

The Eskimoes to be met in Nain to-day are thus no 'human fossil' as rumour described them before I met them in person. Certainly their outward appearance has been tidied up, their manners and customs thoroughly improved and their tools and equipment modernised: if one compares them with their forefathers of a century ago and their racial cousins in Baffin Land (68 a, 223), Hudson Strait (742) or East Main (183) at the present day, it is no exaggeration to say that they have undergone a p o s i t i v e m e t a m o r p h o s i s (more of this later on). Yet below the new creation it is not difficult to perceive the old threads in these hunting people's way of living fairly unchanged, for in the economic life the most important of the original manners and customs have been preserved to a large extent as before. Their very disposition has still, after the civilizing process, the same, sunny, open stamp which has always won the sympathy of the peaceable stranger.

At every kind of hunting, except that of the caribou, the hunter is usually accompanied by his family: the hunting nomadism continues. Yet the

Eskimoes of Nain are not hunting nomads in the strictest sense; they have traditionally at least one fixed winter abode and around this circles their half nomadic life at the present time.

Working life of the Arvekmiut, the folk of Hopedale.

When the spring seal-hunting is at an end the hunter vegetates for a time in his hut at the mission station in Hopedale. But when the shoals of caplin make their appearance he devotes a good deal of his time to catching it; some of it is eaten by the people, but some is covered with a little train oil and given to the dogs. Salmon is not much caught, but when it is it totals only about 5000 lbs.

Then follows a dead period if the cod do not appear at the usual time. Some devote themselves to putting their nets in order and the house is brightened up.

Normally the cod-fishing begins about the 15th July and lasts well into September. Usually September and the first part of October are chiefly employed in felling trees and cutting firewood, and this can continue till the hunting of fur-bearing animals begins.

About the 15th of October, when the fur has grown and become beautiful, the Arvekmiut begin trapping, especially the fox. The hunting-ground is not far away, at the most some 50 miles from the station; mostly the Eskimo lays his traps out on the islands where the seal can also be caught.

Most of the Hopedale Eskimo begin to hunt seal when the fiords and sea begin to freeze, for then comes the Greenland seal from the north, the greatest prize. Those who have nets can catch seal even earlier in the sounds and the fiords, but their poorer brethren must shoot or harpoon the seal in the open holes or on the ice. At this time the hunter's base is at Hopedale, but he extends his hunt for miles out to sea, seeking the breathing holes and the crevices where the seal lies; on many of the islands wooden shelters have been set up and these give the hunter some little protection from the elements. Thishunt often lasts only a week or a few days depending on when the seal comes and how cold it is, for when the sea freezes all over it is impossible to pursue them.

After the seal-hunting of late autumn the Eskimo devotes himself to trapping. But if the ice conditions are favourable he goes off now and then to the sinâ, 10—20—40 miles from the coast, and there seeks the breathing holes. This form of hunting is precarious, for if the drift-ice comes down from the north or all the holes are frozen over that puts an end to it; a ground swell,

too, can force the hunter to return home. Sometimes a few walruses have been caught far out on the sinâ.

After the 15th of March it may be said that sinâ-hunting is at an end: the Eskimo then takes to felling and chopping fire wood once more.

But again the snow begins to melt and again the Eskimo makes his way out over the ice to seek the breathing-holes and catch seal.

Later, when the winter-ice has broken up and the great herds of Greenland seal wander along the coast on their way up north, the spring seal hunt begins at once with net and harpoon, for the seal disappears with the drift-ice. With this hunting finishes the cycle of the year.

These facts I received from the Reverend GRUBB, who for decades has had a good deal to do with these Eskimo. From what he related it is clear that the main characteristics in the working life of the Eskimoes have been preserved in this district also.

There are, of course, some differences in their seal-hunting methods conditioned by the different geographical characters of the two districts. In Hopedale the islanded area is comparatively limited and open, with low islands and small fiords, where the height of the tide can be nearly levelled out. The Nain archipelago is extensive, the islands larger, the fiords narrow and deep, and the tidal currents attain a considerable strength and size. In Hopedale the semi-nomadic way of living has almost ceased because of the short distance to the trapping-places, which makes it possible to use the station as a base.

Seal-hunting is also in principle the main earnings of the disparaged Hopedale Eskimo, and their continued existence as Eskimoes stands or falls with the exercise of this form of livelihood. But in this respect it is said that their position has become critical since the Moravian Mission handed over the trade to the Hudson's Bay Company. The Mission used to be responsible for the seal nets and at the same time saw to it that the seal products were sold at a reasonable price. The trade of the post of to-day is said not to be interested in seal products, and it attaches importance to the fur trade only. Very few of the Hopedale Eskimo own seal-nets and trout-nets, so the catch is decreasing and the people are becoming poorer; of the population on 1st January, 1939: 106 Eskimoes and 184 settlers, there were only one family of Eskimoes and one settler family not living on poor relief. The Hopedale Eskimo therefore views the future with anxiety; all his equipment is wearing out, the houses decayed, his clothes are ragged, and when baking is to be done his wife must make her way over to a more fortunate neighbour who owns an oven. Nothing can be repaired, it was said, because they do not earn enough for their needs; cash

was paid only for fur-skins. Things were especially bad in the winter of 1938—1939 when the catch of both seal and fur-bearing animals was very poor. The people were exhausted and suffered great privations, and the resulting diseases began to rage, e.g. scurvy, beri-beri, carbuncles and tuberculosis gained ground. In the spring of 1939 many of them had no bread from March to July, only some few could procure flour from Davis Inlet and that at the unusual price of $11.50 per barrel.

— If I am rightly informed, what has been said above about the Eskimo way of living is true also of the settlers in the district of Hopedale. It is clear that nature herself has compelled also them to adopt this way; the changes for good or evil in the economic conditions affect them both alike. —

We now move to the farthest north of the peninsula and survey

The Eskimoes on the eastern shore of Ungava Bay.

In sketching the annual routine of the life of the Ungava Eskimoes Turner begins his report with the breaking-up of the ice in spring. This period may vary ten or twenty days. When the season has sufficiently advanced, all the belongings of the family, boat, kayak and other personal property were put on sledges and transported down to a place where they were stored on shore until the outside ice of the bay was gone. While waiting the men hunted various kinds of land game and fowl.

When the bay was free from ice the hunters crept along shore to the objective point. Sometimes the party divided. The men sought seals, hunting in kayaks, the women and children searched the islets and coves for something edible, every accessible bird's nest was robbed of its contents.

By the 25th June the people thought of returning, as the seals were becoming scarcer and the birds had again laid eggs. The Eskimoes arranged to drive white whales when the season came about the 12th July. The whales were driven into an enclosure of which the sides were formed by nets. There the whales were speared by the natives, dragged ashore and skinned.

Then began the setting of the nets for the salmon, and this fishing continued from 25th July to 1st September.

Later the natives must be up the river to spear caribou crossing the river (cf. p. 683). This hunting lasted until the deer had begun to rut.

The season was now so far advanced that the river might freeze; the hunters had better begin to descend the river to a place near the sea where the winter

could be passed. When the snow had fallen, winter quarters might be taken up. Traps must be set for foxes and other fur-bearing animals. Ptarmigan arrived in large flocks and were eagerly hunted, and the people subsisted on their flesh and the meat of caribou killed in the fall until the ice was firm enough to allow the sledges to be used to transport to the winter camp. Hunting excursions were made to various localities for stray bands of caribou. Also with their dog-teams they hauled wood to the river banks to be floated down in rafts when the river opened in the spring.

The life of these Eskimoes was not so very unlike that of the Naskaupi Indians (p. 681 sqqq.), which, as will be shown later on, was wholly supported by the wild reindeer. But in the account just given it is evident that their working life includes the elements of the coastal culture too. They were in the beginning of this century in the habit of moving out to Killinek in the spring to hunt there and about Tutjat (Button Islands), where there is plenty of game, both seal, walrus, and polar bear. It is a very difficult hunting district to move about in, this island area being full of dangers because of the violent tidal currents and storms. Therefore the men must be excellent sailors. In this connection their spring moves were revealing, for they were as amazing as they were bold. Up to recent times they would pack themselves, bag and baggage, on to an ice-floe in the district north-east of Fort Chimo, where they made the summer haul, this very original vehicle was then allowed to be carried slowly along by the current the whole distance of 180 miles down to Killinek (at Port Burwell), while they passed the time hunting foxes and catching seal, all the time surrounded by their families, their dogs, sledges and household utensils. When they arrived at Killinek they abandoned their frail bark and made their way up on to the land (578). They stayed in the district till the beginning of the next winter, when they returned to the Ungava district by dog-sledge. It is to be regretted that more detailed information regarding these Eskimoes' material culture and the changes it has undergone is not available.

— Flaherty (65, 66) has given some reports of the Eskimo living further to the west. —

We shall now consider the little group of Eskimoes living farthest to the south from whom can be obtained an idea of the variations within what is to a great extent an exclusive Eskimo culture:

Working life of the Rigolet Eskimoes, the most southerly in the world.

The Karwalla or Rigolet Eskimoes (208) are clearly the survivors of those of Hamilton Inlet who were once so numerous (cf. p. 466). On a map from 1757 annexed to the work of de la Harpe (405) the note 'Habitation des sauvages' is placed at about the contraction of the sea that leads to Lake Melville; also outside the present Rigolet on the southern shore of Hamilton Inlet can be read 'Ance du Batiment' [presumably a trading station: see farther on and p. 481]. In the olden days the wanderings of their ancestors stretched not only far to the north and south along the coast, but also some distance inside Lake Melville, even up the valley of the Hamilton River. The struggle with the Indians drove them back towards the east as we have seen (p. 482). But in their present area they steadily remain.

This group though small is very active, and keeps to the district around the sound between Hamilton Inlet and Lake Melville. It is composed of eleven half-nomadic families, which form what may be called the rearguard of the Eskimoes. They belong to the Church of England in contrast to the other Eskimoes of this coast who are Moravians: they have therefore scarcely ever enjoyed the advantages of the missionaries' direct care and guidance like their fellow tribesmen in the north.

The families were in 1937:

Mark Palliser	Winter station	English River.
James »	» »	» »
Hugh »	» »	» »
Joseph Palliser of Mark	» »	Snookes Cove.
» » » John	» »	Webers »
Mark Mucko	» »	Peter Lucy's Brook.
Peter Adams	» »	» » »
William Ikey	» »	Back Bay.
Charlie »	» »	» »
Wilfred Shiwak	» »	» »
William »	» »	Rigolet.

It is said that in 1842 the total number of these Eskimo families was eight (208); among them at least there can be no talk of a tendency to die out. To me they seemed to be fairly pure of race.

Although these eleven families have lived for a long time apart from their fellows in the north, they have preserved the same semi-nomadic habits and customs, and their life is divided into the same seasonal sections. They, too,

choose their camping places with consideration of the natural resources of the district at different times of the year.

As an example can here be given the migratory life of their 'alderman' MARK PALLISER, called »King Palliser». He spends the winter with his family at English River on the south-eastern shore of Lake Melville where he owns a hut; there he sets out traps for the fur-bearing animals, especially the fox. In the spring he moves out to Big or Henrietta Island and stays there as long as the salmon-fishing lasts, that is, the middle or latter part of July (cf. Fig. 223). Next he moves with his family to Hamilton Inlet, where he spends the cod-fishing time at Turner's Bight 18 miles east of Rigolet. Finally in late autumn he moves back to his winter hut on Lake Melville.

Of course many long excursions are made in different directions from these seasonal dwelling places. For example, the Eskimoes of the Narrows go out to the ice-edge with their dog-sledges to hunt the Greenland seal on its way northward. Later they net seal, and that is still being done in Hamilton Inlet at the end of May, at times even until the end of June. From all that one hears of them it appears that these Eskimo too, catch seal as their favourite sport; for them, too, the seal is the most useful game as regards food both for themselves and for their only domestic animals, dogs; it provides them further with clothing and objects which they can sell.

It would be difficult to think out any other arrangement of living which fitted in better with the resources of the districts and the possibilities for their utilization. A proof of this is the fact that the natural conditions have compelled also the livyeres of the area to adopt the same life and customs. In a later connection it will be seen that the white trappers have also found it wise and practical to imitate the Eskimo ways in Labrador (p. 726).

These Eskimo are regarded as being fairly well off. The salmon-fishing brings them a considerable income: for example, I saw Peter Adams on July 12th, 1937 take up in one catch 70 salmon with an average weight of 12 pounds. Because of this prosperity some outsiders have joined them; for example a gifted young man (whose white mother belongs to an old Labrador family and whose father is a Montagnais Indian) settled down with these Eskimo and later married an Innuk he met in Baffin Land who appears to be unusually pure of race.

* * *

Primitive people are children of the moment, they have many fancies and love variations and changing their habits and customs somewhat. For this reason many deviations from the above main plan can be observed also among the Eskimoes of Labrador at the present time. Here, however, there is not sufficient reason to go into such details.

In any case the economic life of the different groups of Eskimo on the Atlantic coast follow the same cycle in principle. Some seasonal stages are added or omitted according to the natural character of the district, and some habits are changed somewhat. Nomadism is most developed in the extensive Nain archipelago, and — strangely enough — the Rigolet Eskimoes are still half-nomadic. The hunts of the Hopedale Eskimo are not very widespread, for, like the former Okkak Eskimo, their winter village can also be used as a base for the winter hunts. The Eskimoes at Hebron, who are on the very edge of the Ocean, feel least of all the need of a migratory life.

The part of the skerry fence the Eskimo knows is nowadays relatively small. He circles in a restricted area year after year and in this the habits soon become set in a fixed mould, a local variant. The knowledge of the country is therefore limited to the few miles he tramps to fox traps and the longer journeys that he makes in the spring in the tracks of the reindeer. It was otherwise in bygone days (cf. p. 512).

The coastal culture of the Eskimoes in Newfoundland-Labrador is becoming more affected by the inland culture.

The description given above of the annual socio-economic cycle among the Eskimo of the Atlantic coast reflects chiefly the basic elements of that culture which goes under the name of the A r c t i c c o a s t a l c u l t u r e. It seems probable that a purely coastal culture formed the basis of the livelihood of their forefathers when, once upon a time, they wandered into the Atlantic coast of Labrador. This has not only been the foundation of the subarctic Eskimoes' material culture, but has also been its consolidating element. Capricious mass migrations among the land animals can disturb or even completely alter the customs of the hunting nomads if they have been founded exclusively upon hunting, and compel them to seek a new habitat. On the other hand the supply of sea animals does not seem to be subject to any such sudden and thorough fluctuations as we know among the land fauna, so that a life based chiefly on capture in the animal world of the sea is seldom exposed to such capital risks as, for example, that of the Caribou hunters (cf. the Naskaupee later on). Clearly this is why the culture of the Eskimo at the Atlantic coastal strip is

so stable compared with that of the Indians in the interior. A contributory cause is the fact that, like the Eskimoes of the Pacific who were excluded by the Indians from the attractive hunting in the woods and on the mountains of the interior, the Naskaupee and the Montagnais Indians have done their best to exclude the Labrador Eskimoes from the chief haunts of the caribou and the fur-bearing animals in the interior (cf. however p. 441 sqqq.). This is another reason why the Eskimoes have become more or less exclusively dependent upon the resources of the coastal belt.

Among the Labrador Eskimoes chieftainship has been reduced to a minimum, sociopolitical organization is lacking, and hunting is the all-engrossing need of the people (606).

From the older descriptions scarcely any definite impression is obtained that the half-nomadism of the type we know to-day stamped the economic life of the forefathers of the present Eskimoes of Labrador. It seems more probable that they then, like the wandering tribes of the Canadian Arctic, moved along the coast over very large areas and stopped here or there for a time when the prospects of catching seals were good even as late as when they first came into contact with the white men. These people have probably never formed any more permanent territorial clan groups. At the primitive stages of culture nature herself in time brings about the best possible equilibrium between the customs and habits of people and the natural resources of the habitat and their utilization. As the natural conditions vary very much in the different parts of the coast, and as in each part equilibrium can be attained only as the yearly cycle of their nomadism is constantly adapted to them, this equilibrium could not be fixed in former times because the groups constantly displaced each other. The territorial grouping based upon fixed winter dwellings which now exists and upon which we have based our description, can be assumed to have developed after the arrival of the Moravian missionaries on the coast, some time after the middle of 18th century. The missionaries have certainly greatly influenced its rise, and they have even planned it with such thorough knowledge and such far-sighted judgement as the Eskimo themselves could scarcely have shown. The habits of the natives then became more specialized on the above lines.

— In passing it may be right to correct a rather general misunderstanding. It is natural that the missionaries invited the Eskimoes to collect around the stations because the good shepherds considered it wise to keep their newly won lambs under their eyes lest the wicked wolf in the guise of an *angekok*

(shaman) should go off with them again. Superficial observers have been heard to say that by this reform the Eskimoes' means of livelihood deteriorated. This is quite incorrect. The missionaries themselves have done their utmost to get the Eskimoes to retain their inherited, sound ways of living and prevent their proletarisation in closely packed societies. They have therefore encouraged the natives to spread themselves during the hunting and fishing seasons out over the area where they hunt in agreement with the principles of nomadism. The very complete literature of the work of the Moravian Missions in Labrador (see bibliography) gives full proof of this. The Eskimo's way of living has hardly been injured by the village life. We have seen above that the huts in Nain are only lived in during the rest periods, so that nomadism continues and perhaps even more systematically than before. Even if the winter dwellings are now the same from year to year, this in itself does not seem to have been at all injurious. My personal impression is rather that this reform has been of the greatest advantage for these small groups, their preservation, and civilization. It seems me much more probable that the Eskimo themselves discovered the advantages of living near the missions and that is why the winter village groups moved to the mission stations from the different fiords where they used to live. There they were within reach of care and attention if their health demanded it; the children had the chance of going to school, the old people of trading and all kinds of entertainment, especially music. My personal impression is, therefore, that the custom of living in villages during a part of the winter became stabilised rather spontaneously through the Eskimo themselves. Naturally this stabilisation was assisted by the fact that the missionaries had secured rights not only over the reservation areas but also to decide who should be allowed to settle within those areas (in this way they kept out traders of the bootlegging type). This resulted in the Eskimo reservations.

At the present time one has the impression, however, that in the last few decades the material culture has been evolving. It has been affected by the arctic inland culture, the culture of the caribou-hunters; see e.g. the Ungava people. The Eskimoes have of course always hunted the caribou when they found them on the coast; their folk-tales relate how the spirits of the Eskimo migrated to the interior to hunt foxes, and how in consultation with Superkugssuak the angekok could send caribou to the Eskimo when he hunted there. In older times, too, they used to trap some fur-bearing animals. But at least already about 1900 hunting the caribou began to be practised on a big scale in the fiord valleys and the moors in companies, assuming such

proportions that on one hunting excursion made by the Eskimoes from Okkak and Nain 700 caribou were shot, according to McGregor. The income from trapping fur-bearing animals became more and more important in the household budget. It is therefore clear that some shades of the inland culture are more and more sharply showing themselves in the local arctic coast culture. This development has been possible because of the peaceful relations with their neighbours the Indians, as formerly the Eskimoes did not dare to make their way into the interior. The tendency of future development is to me quite clear, for, as the Naskaupee Indians disappear from the country and the hunting districts become evacuated, the energetic Eskimoes will take possession of them (compare above the Western Ungava Eskimoes). It seems, therefore, that a way of living will develop such as we shall find among the trappers in Dove Brook (cf. p. 721) and such as can be said to form the ideal for the hunters on the Atlantic Labrador coast.

The gradually increasing addition of inland culture to the Eskimoes' economic life is only a link in the series of new developments and progress which can be observed throughout the whole of their culture, both the material and the non-material. This complex of changes is perhaps the most interesting anthropo-geographical phenomenon of the sphere we are studying. It may be said that no more or less than a c u l t u r a l m e t a m o r p h o s i s is taking place in the Labrador Eskimoes mostly to the advantage of both the individual and the race.

More concerning the cultural metamorphosis.

The frozen sea still locks up the land for eight months of the year and this keeps the Labrador coast within its own icy loneliness. It does not seem that the country is more accessible by any change in its nature or in its climate! But the summer travellers have brought Labrador more clearly on to the track. A change has come over the people of Labrador during the last fifty years, Dr Hutton stated in the beginning of our century. Civilization in its march has touched the coast with its fringe. The explorers see a world to conquer.

Changes regarding equipment and its use.

The Eskimo was for a long time slow to accept new ideas and slow to change utensils; like primitive tribes in general he liked things in the same groove from generation to generation. The very lack of school education

was maybe one of the principal causes of their narrow-minded conservativeness. The influences that combine to educate the mind in other countries are to a great extent denied him in the loneliness of Labrador. Labrador was all the world to the Eskimo. But finally he became accustomed to the modern ways of life and to new inventions through the white pioneers. And what do we see today? the Eskimo playing the gramophone, for instance. And even the 'movies' have been seen in Labrador. The wireless has also come, there are several stations. The radio enables the Eskimo to set his watch by the striking of Big Ben. The noise of the airplane, *tingmi'suak* (= the great bird), has been heard by the Eskimo, and some of them have taken trips in the air. All these marvels are accepted by this childlike folk without question and without fear. They no longer associate such things with the supernatural; their wise guides, the Moravian missionaries, have steered them safely through the troubled years of change, HUTTON writes.

In order to understand this we shall study some aspects of their dwellings, clothing and food, though it is not my intention to give here a systematic ethnographical description of the very captivating Labrador Eskimo; there exist already some fairly good ones by CARTWRIGHT (134), HAWKES (424), HUTTON (472—478), LOW (588), MCLEAN (610), TURNER (965), etc. We shall perceive a slow change for the better, the chief cause of which seems to be the Eskimo's own psychological nature. They are good observers and, like their ancestors, are distinguished by their receptivity and capacity for quick apprehension. For this reason it is not at all surprising that the Eskimoes of Labrador have with avidity seized upon and assimilated all kinds of new acquisitions with their inherited culture, if they in any way found them advantageous for their way of living and the efficiency of their occupations, resolutely discarding old customs and equipment.

DWELLINGS.

For the old Eskimo, as for most primitive peoples, the home has been only a shelter against cold, rain and wind; it is somewhere to sleep securely and to keep the captured game safe from prowling dogs. The dwelling therefore remained very primitive until recent times, and even nowadays it is almost only a mean little shack built of rough tree trunks or planks and floored with packing-case boards. But even this change must be considered an enormous progress from a sanitary point of view, as their medical man, HUTTON, soon found. However, it took some time before the northern Eskimoes became acclimatised to the warmth of the wooden huts.

A century ago the Eskimo of this coast still dwelt in hideous stone huts, i g l o o s, dug in the sodden slopes of a hill on their winter places; Fig. 235. The interior was dark and noisome, the floor, the walls begrimed with soot and grease, the air stuffy. A small allowance of light filtered dimly in through the membrane of a seal's bowel stretched across a hole in the roof. One joined two or three houses together: living room, bedroom and storehouse. In some cases two or more such earth huts — w i n t e r h o u s e s — were grouped together into something like a village society. At that time the Eskimoes used to wander along the coast as they were inclined, sometimes a family joined one of the already existing groups of dwellings, sometimes they would burst away and, as they became interested in another group, join them. — In Ramah in the winter of 1906 sixty-nine people were gathered in the *igloo-suaks* heated with stone lamps (995).

In the turf and stone igloo the only ventilation was the occasional breath of air that wafted along the tunnel-like porch. Dr HUTTON points out: I cannot imagine anything more dismally unhealthy. Imagine yourself on the floor of a badly lit and worse ventilated Eskimo turf igloo in Labrador. The seal-oil lamp is burning; it is no more than a half-moon shaped trough, hollowed from a piece of soapstone and half-filled with thick brown seal-oil. A flat wick of moss leans on the edge of the trough, dipping into the oil and burning with a steady white flame. The part farthest from the entrance is the sleeping-place, occupied by a platform of moss and earth spread with skins. Upon this platform-bed the hunter snores, when he has returned tired from his hunting trip, while his wife turns his boots to dry and patiently rubs them supple, ready for the next excursion. Wherever you look is dirt and vermin and nauseous food. You have maybe to eat this fishy-flavoured meat handed to you by fingers innocent of washing except for the dipping in the sea when hunting the seal. The floor is strewn with the litter of work and scraps of sealskin, fishbones, bits of putrid meat flung down at meal-times. Some folks have to share an igloo with some other family and this leads to endless quarrels and jealousies (478).

Such was the primitive winter dwelling of the Eskimo on this coast. The picture had remained unchanged for many centuries, the gloomy homes were still dark igloos of turf and stones; cf. in 472 picture facing p. 40. What few pieces of wood they needed for building they gathered from the drift-wood on the beach. There were no stoves in these houses; the cooking was done either over seal-oil lamps or over fires of brushwood out-of-doors.

After the Moravian Mission arrived successive improvements in the dwellings took place. In the beginning of our century the people still had huts of wood built into the earth, looking from a distance like heaps of turf or sods, with a tin pipe sticking out of the top and long low tunnels leading up to the side; cf. in 472 picture facing p. 308. It required no little labour to erect such

a dwelling and consequently a family stayed in it as long as possible so that it became fantastically dirty and foul; besides this it had not even such ventilation as is possibly with the draughty walls of an ordinary wooden hut. A new acquisition was the little iron stove. But inside all was still smoke-blackened and shiny with grease, the evil, rancid, fishy smell of stale seal-oil and putrid flesh remained, and the only suggestion of air wafted sluggishly through the low porch. The result of all this was, of course, injury to the people's respiratory organs, and the only remedy they knew was recourse to the *angekok* (p. 548 sq.). The heat from the stove combined with the smell made the atmosphere still almost unbearable. In some of these igloos, in winter, with their long snow tunnels to keep out the cold and at the same time effectively the fresh air away from the door, I have had to gasp for air, said HUTTON, how can folks be healthy in homes like that, in this sort of air? he asks. Even the craziest shacks must be better than these dwellings.

More wholesome were the temporary dwellings: tents and snowhouses.

The frame of the tent was a bunch of poles asymmetrically stuck out through a hole in the top; a seal skin cover was thrown over them and kept in place by big stones laid upon its edge; cf. Fig. 226. The rocky ground make the use of tent-pegs impossible, and in stormy autumn nights the tent may blow over. Therefore one tries to find a rocky wall or something similar as shelter against the north-west wind. In bygone days the tents were of the same type but covered with reindeer-skins stitched together with sinew and stretched on poles with the hairy side outward. But nowadays only the lighter calico tents are in use, and they afford just as good protection from the weather. They are also easily mended and can be packed up into a neat little bundle. Various types exist; cf. Figs 226 and 223. In the tent the air is always fresh. But it is not always good for the tent dwellers on a stormy and rainy night; the tent is not proof against torrential downpour, the inhabitants are like drowned rats, but show the same placid smile (476). The Eskimo in the north use rough masonry lean-to huts as well as tents.

In the north, where wood is lacking, villages of snow are built. But on the Labrador coast the Eskimoes consider the turf or wooden house to be more secure and lasting. Here the real snow-houses are used only when the people are moving about the country. It is indeed not expensive to make a provisional Eskimo home in winter. A snow-house for a short journey can be built in a couple of hours. It is, however, generally on towards December before the snow is beaten so hard by the wind that the building of snow-houses can begin.

The snow-houses used on sledge journeys in Newfoundland-Labrador are but poor imitations of the real thing with its ice-window and its protecting wall and porch. Quickly the Eskimo cuts slightly curved blocks from the frozen drift and inside the circle piles them one against the other in spiral fashion from left to right and stuffs the cracks with powdery snow. The house becomes so strong that one can sit placidly inside while a man crawls over the top. The window,

if put in at all, is a sheet of clear freshwater ice. The air in the house scarcely rises above freezing-point. The snow-house is always protected by a wall of snow a few feet away, which keeps away the destroying wind. In the better snow igloos the door is reached by a tunnel running uphill (476). In May the snow-house begins to melt and threatens to tumble in upon the occupants, the tent must be used.

— It had no doubt a favourable influence on their health when these Eskimoes lived all the year round in tents or snow-houses and knew nothing of the permanent winter houses of grass-sod etc., which are veritable hotbeds of tuberculosis (80 a). —

Little roughly hewn wooden huts in the midst of a tangle of forest or shrubbery have in the end sprung up like mushrooms. Such dwellings have grouped themselves into a little hamlet round the central buildings complex of the mission stations, church, school, shop and, later, boarding-school cf. Figs 236 and 237. Nowadays the hunter wants a wooden house, he does not want to go back to the dirty, unhealthy earth mounds in which infantile mortality must have been terribly high. He seeks out the best of the stunted trees in the woods, chops them down and carries them home. With his wife's help he saws them into beams and rafts and planks. He lays a foundation of stones from the beach and erects his beams and joists upon it, he works intently and seriously and before the next winter the house is ready.

The Eskimo square wooden hut is at present a very humble dwelling, but it has immense advantages in comparison with the old igloo of turf and stones and a few rough beams, HUTTON writes. The white man has often to stoop because the doorway is too low for him. One must be careful in passing the dog tenants of the porch, if one of them is struck with the foot it raises its head to snarl and shows wolfish teeth. Through the doorway you enter a square room. The air is not so bad, although steaming heavy and warm, and a tremendous fishy smell comes from the cooking, the floor is not very dirty. In the winter you may stumble over a couple of plump seals brought in to thaw, behind the stove on the wall is stretched an oily sealskin to dry. One corner harbours a little table on which stands a lamp, it is also strewn with cups and spoons and knives and fishing-tackle. Various queer looking objects lie at the edges of the floor: snow-shoes, dogs' harness, whip, bladders, slabs of dried meat, bundles of straw for basketmaking, boots and clothing, etc., and a keg of water stands near the wall. A big, rough home-made bedstead fills a corner. It is made of rough boards and spread with deer-skins and a patchwork counterpane. The children of the household are playing on the floor. But the characteristic Eskimo smell cannot be abolished. Every home, dirty or clean, has the same odour.

Many of the houses are architectural curiosities; cf. Figs 238 and 239. Some of them show signs of much patching; on the grey and weatherworn boards you will see light pieces added; the front looks curious with its windows covered with boards, a necessary protection against the wild draught dogs who may try



a.

b.

Fig. 227. Eskimoes in Hebron. Photo the author and I. Hustich, 1937.

to break in and steal; it has indeed happened that the dogs have torn up the roof to break their way in and steal when they have been left at home at cod-fishing time. In time the house is made larger and it can completely lose its individuality with such a process, the walls being pushed back to meet the needs of the growing family. Then one can find behind the square room, for instance, a big, oblong shack with a sloping roof, placed crosswise, so that the little, square part of the house looks into it from one side. In the middle of the room is a table surrounded by the customary wooden box that serves both for seats and a storage place. At two ends are the sleeping-places, roughly partitioned off.



Fig. 228. The family Boas Obed on M/S '*Maraval*'. Photo the author, 1937.

A peep behind the partition discloses an array of bunks where the children sleep, sometimes one above the other like berths on board a ship, sometimes side by side. Some houses are a real credit to their owners: there are sofas and a harmonium, linoleum on the floor, etc. In some houses you might find even some books: the Bible, a hymn book, the Pilgrim's Progress, etc. About the beginning of this present century CHRISTIAN SMITH introduced an Eskimo newspaper: *Aglait Illunainortut* [the Paper for Everybody] (476, 478). PRICHARD 1910 tells of a very industrious man who possessed an extremely comfortable house with lace curtains at the windows. He had ordered fine furniture from St. John's for his sitting-room, which had armchairs, rocking-chairs, a piano, etc. The owner was besides always very good to the poor and to the widows.

Warmth is one of the most serious things to be considered in the wooden house. The modern Eskimo has lost to a great extent the coating of fat that his

forefathers possessed, and the stove must now take its place as his natural overcoat. One cannot have more than one stove, the firewood is far away.

Like primitive folk in general the Eskimo love to build. Here and there one can see piles of sawn planks near the mounds of firewood. But they can construct larger buildings too. During some stormy days when it was not possible to go fishing in the boats the Eskimos built a church with their own voluntary labour at Uviluktok near Hopedale. Even the decorations of the interior were carried out by the Eskimoes. With willing hands and happy minds they rebuilt a new church at Nain, when their old one had been destroyed by fire (478).

Thus the dwellings are better to-day than some decades ago and the aim of every man to have his own house has been almost realized all along the coast.



Fig. 229. My pilot Julius Nathanael from Nain on board the Strathcona. Photo the author, 1939.

As appears from the above account, thorough changes for the better have come about with time. Of course, further changes are necessary and we may hope that they also will come. But the possibility of realizing them is now a question of money. If the products of the Eskimoes' work are justly paid for, there is no doubt that their dwellings will become increasingly healthy and comfortable. Under present conditions they can scarcely improve more than they have done.

Clothing.

Primitive people having adapted their clothing to their surroundings during a long period it is quite usual that it remains unchanged in shape and form century after century. The winter clothing of the arctic and sub-arctic natives especially is in such close agreement with the climatic exigencies that there is little possibility for variation and improvement, and the outfit of the fur-clad people in winter is mostly reminiscent of the dressing of ancient times and still unsurpassed in its suitability.

From top to toe they were in bygone days clad in sealskins. CURTIS (196) tells in the 1770's that between the dresses of the different sexes there was no variety, except that the women wore monstrous large boots, and their upper garment



Fig. 230. Eskimoes at Cut-throat. Photo C.-G. WENNER, 1939.

was ornamented with a tail, Fig. 240. In the boots they occasionally placed their children, but the youngest was always carried at their back, in the hood of their jacket. However, it will soon be a century or even more since one was able to say that 'the Eskimo is a singularly composite being, — a link between savage and seals, putting the seals' bodies into their own and incasing them-

selves in the skins of the seals' (325). Since the Labrador Eskimoes on the Atlantic coast have been in close contact with the whites, their clothing has gradually changed, for they like to imitate the white man's fashions. At

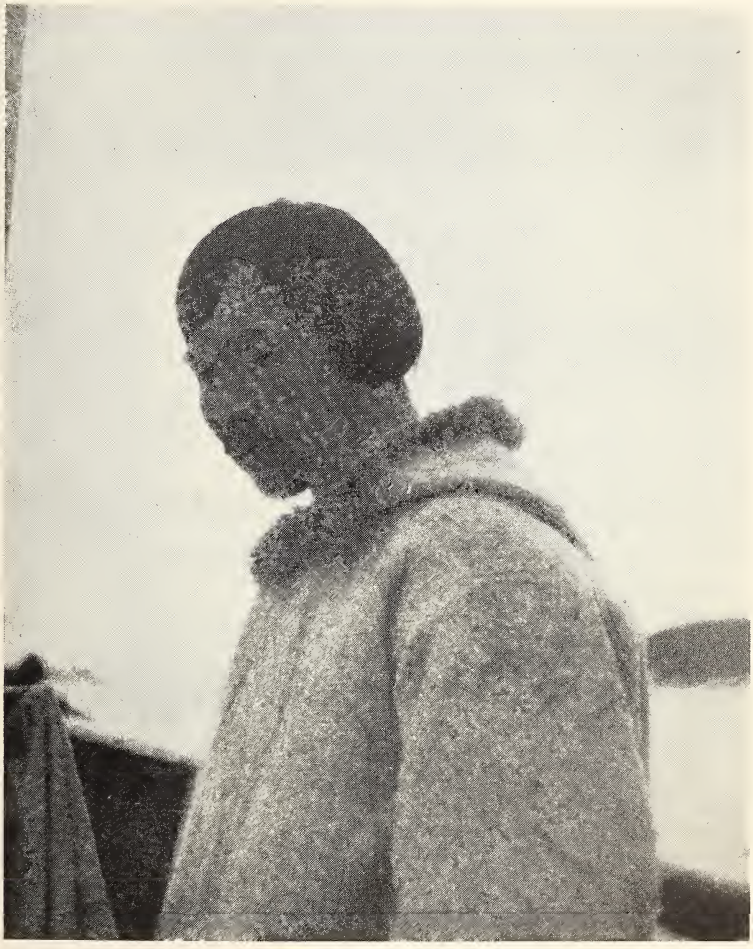


Fig. 231. Eskimo at Cut-throat. Photo C.-G. WENNER, 1939.

present they like to dress in European frocks, or jacket and waistcoat; cf. Figs. 219 and 233. Instead of the men wearing hooded smocks — cf. Figs 228, 232, 241 and 234 — and the women long-tailed native *sillapak* — cf. Fig. 240 — you will find the men in fishermen's jerseys and sea-boots, the women in skirts and jackets — Fig. 243 — and hats of many fashions, HUTTON

stated already at the beginning of our century. PRICHARD, however, wrote at the same time that in Killinek the people were just emerging from the wild state. They wore skin garments and the babies were carried quite naked in the hoods of their mothers *attigeks*.

Otherwise on some of the southerly Eskimoes there is practically nothing left of the original Eskimo costume but the boots.

Meanwhile the dressing of the majority has still some traits which give them the specific national stamp, and also correspond well with the conditions of their life; cf. Figs. 227, 228, 216, 220, 217, 229, 218, 230, 231, 232, 241 and 244.

In the summer they like to dress in blanket cloth, bought at the store, and cut and sewn after the old Eskimo pattern by the wives and daughters of the household. The men wear a blanket smock or '*dickey*' (corruption from the Eskimo word *attije*), which is a hooded frock. Ordinary trousers and sealskin boots, *kamiks*, complete his costume. The women wear a *sillapâk*, which is made of white calico, with a short tail in front and a long tail behind, it is 'the outside thing of all'. The wealthy ladies generally wear lovely fur round the hood. In olden days the women used to wear trousers; Fig. 240. However, probably because they were afraid of being laughed at, they adopted the skirt. Kamiks they still wear. A girl is however not allowed to have the big hood until she is old enough to get married; so the little girl who sets out to act as nursemaid borrows her mother's; she would be helpless without a hood, to carry the child in her arms would never satisfy it. The hood has been the Eskimo's cradle longer than memory can tell.

An interesting habit is the use of different colors in the clothing. On their sillapâks and kamiks married people use blue bands, unmarried red. Good custom demands that a young girl ties her plaited hair with a pink ribbon, a married woman uses blue, a widow white. Instead of the mysterious hand-bag of our ladies it is true Eskimo fashion to use the leg of the woman's boot as a pocket. From thence she brings out the most varied articles: handkerchief, pipe, hymn-book, biscuits, etc.

Dr HUTTON is no doubt right when he considers that the clothing of the modern Labrador Eskimoes corresponds well with the demands of health and comfort in the natural conditions of Labrador. Moreover, it is an interesting fact that they all, men and women alike, have clean outfits for Sunday wear, they would never go to the Service in a dirty state. The men wear snowy *sillapâks*, the cotton covering for the hooded blanket *attigeh*. The women are fastidious about their hair, which they wash and comb (476).

FOOD.

Many curious stories can be heard concerning the Eskimoes' diet. CURTIS (196) in the 1770's wrote: When they are pressed with hunger, and have nothing to satisfy it, they make their noses bleed, and suck the blood to support

themselves! It is true, they have many peculiar dainties, but their main food is amongst the healthiest one knows.

In the subarctic conditions the well-being of the people depends essentially on the kind of food available. The mostly good health conditions amongst our Eskimoes witness to the fact that their diet is appropriate.

During his long stay amongst the Eskimoes at Okkak Dr. HUTTON studied their diet very closely. The list of their foods is long, he states: seal-meat raw, dried, boiled, fried, made into a stew with flour, seal blood; the flesh of reindeer, foxes, bears, hares, sea birds of all sorts, eggs of gulls, sea-pigeons and ptarmigan, trout and cod and salmon, boiled skin of white whale and the walrus; raw reindeer lips and ears. Dried trout stomachs, seal-flippers and half-hatched gull's eggs are real tit-bits for the Eskimo. An epicurean dish is seal's flipper which has 'hung' some time so as to be tender; nothwitstanding this the party at such feasts can fall seriously ill. The Eskimo says: only strong (= more primitive) people can eat rotten seal flippers! Vegetable food they ignore. Mushrooms they do not eat. But different herbs are used: the shoots are plucked and mixed with the meat. In hard times they also eat reindeerlichen and tripe-de-roche' (p. 343). Roots and 'tubers are collected by the women. Berries are a great boon, the people gather barrels full, especially crowberry and *akbik* or bake apples (cloudberry). About 20 kinds of berries are eaten, mixed with fish or meat. The cloudberry is the most important, next the bilberry.



Fig. 232. Eskimoes at Port Manvers. Photo the author, 1939.

Fish play no small role in their diet; they are split, washed and dried well in the open. Cod, trout, salmon and caplin with sea-trout are all equally liked. They dry them without salt on poles and make *pepsi*.

The Eskimo in still fond of raw meat and rancid oil, a partridge eaten raw and warm is a real delicacy to him. Ptarmigan and white hare he likes very much, and a dinner of fox meat followed by a luscious supper of the precious blubber makes him happy. The Eskimo's principal dainty is freshly killed seal. The children's eyes glisten and their mouths water when the seal carcass flops into the room. The people take the raw, red meat from the half-warm carcass with delight. It is the food they love most; in the Eskimo's opinion no European delicacy can compete with the greasy, raw flesh and blubber. The Eskimo waste nothing of the seal. The meat is the nicest thing he knows, the skin is made into clothing or boots or bedding, the sinews make thread for sewing, the shoulder-blade makes a handy scraper for skins, formerly he used to split the bowel and stitch it for window-panes. Whatever is left can be used as food for the dogs.

But some pieces of the best of the meat are set apart for drying without salt: the dried meat — *nipko* — is a great delicacy. It shrivels and blackens on a pole until it looks anything but appetizing. The leathery nipko is a real Eskimo dainty, and it is also very sustaining food (475).

The most gluttonous Indian would turn green with envy to see the quantities of meat the Eskimo can stow away within his inner self at a single sitting; but on the other hand he can live, and work hard too, on a single scant meal a day, just as his dogs do (994). The Eskimo feast high while there is plenty of meat and drink melted snow or tea with it. They seems to have no idea than to live from hand to mouth. However, the reindeer meat too is kept for the time when the ice is cracking and seals are hard to find.



Fig. 233. The Eskimo Julius Nathanael and his wife at Nain. Photo the author, 1939.

The people live thus literally from the wild animal produce of the country. There are no sheep in their Labrador, no cows, no milk and honey except the kind in tins. They live well and happy, and their health condition will continue to be marvellous as long as they avoid the food that the white man uses, Dr. HUTTON pointed out. All along the coast the Eskimo still keep to the staple diet of raw meat that earned for them in olden days the epithet Eskimo (est'ski'mau = eater of raw flesh). Here we find the reason why the Eskimoes are practically free from scurvy: it is the vitamins in the black and nasty raw seal meat that keep them healthy.

Unfortunately, the use of the white man's food is said to be on the increase. In 1910 PRICHARD stated that in the southern settlements both store-food and store-clothes had gained in popularity, partly because the skin garments were regarded as old-fashioned, but partly, no doubt, because store-garments were obtained so much more easily. But already then it had become clear that the white man's food is not only unsuitable for the Eskimo, but actually sows in them the seeds of weakness and disposition to disease. It is a well-proven fact that European clothes are not adapted to the climate.

Hunting and fishing gear.

The transition affecting the boats has slowly continued. For about the year 1860 the following interesting statistical notes are given by Reichel (787 a):

											Total
Sailing	boats	at	Hopedale	9,	Nain	10,	Okkak	12,	Hebron	2,	33
Fishing	»	»	»	40,	»	20,	»	14,	»	10,	84
Skin (*Umiaks*)	»	»	»	—	»	4,	»	4,	»	6,	14
Kayaks		»	»	49,	»	58,	»	61,	»	46,	214
Tents			»	27,	»	23,	»	31,	»	38,	119
Houses			»	35,	»	32,	»	36,	»	25,	128
Families			»	46,	»	55,	»	75,	»	68,	244
Individuals			»	248,	»	275,	»	327,	»	313,	1163

About 1860 the large skin boat, the women's boat, *umiak*, was rarely to be seen. It had been replaced for fishing and sailing by a wooden boat about the size of 8 tons (787 a). In the period 1861—76 the number of wooden boats increased from 117 to 237 but the umiaks decreased from 14 to 4, the kajaks from 214 to 154. Now, among the means of transport they have the lustily puffing motor boat — cf. Figs 245—247, 244— which is replacing the sailing-boat which displaced in its time the skin boat and to a very great extent also the kajak; cf. Fig. 242. During my journeys I saw only two kajaks in use in Labrador, and no umiak. It is, of course, natural that the motor boat is an invaluable help in the methodical seal-hunting when the sea is open and the old vessels are unable to compete with it. The Eskimo themselves say that the motor boat has wrought a change of the first order because it has increased the capture from the sea 10—20 times. But on the other hand the noise of the motor frightens the seals avay.

The transitions in connection with the dwellings have already been treated. The heavy, clumsy *tupek* of the Labradoreans, the skin tent, is said to have never given complete protection from rain or wind. It has therefore been exchanged for the tent of a fairly water-tight, cotton material (cf. p. 517). This tent is light to carry, it gives more effective protection from the rain, and can be warmed when necessary with an iron stove, just like the trappers' tents. Another reason for this exchange is that the cotton material is not particularly tempting to the appetite of the dogs. For the temporary homes within the fiords — cf. Fig. 248 — as also here and there on the islands — cf. Fig. 249 — small, wooden huts have begun to be set up, especially on the places which are used permanently in catching seal and trapping foxes. On the other hand,

during their winter journeys for caribou-hunting, the snow huts, the *igloo-wiuk*, are still the only dwellings used.

Among the hunting implements the gun has long since displaced the bow; the latest information I found regarding the Eskimoes' use of the bow was when Bell speaks of the Eskimo near Little Whale River at Hudson Bay having killed several caribou with bow and arrow in 1877. Prichard, being an expert hunter, considered, after his stay in Labrador, that it was doubtful whether the introduction of the rifle had been an advantage for the Eskimo. In the old days when the sealer harpooned his quarry he rarely lost it after he had struck it. But with the rifle many more are killed and a good many are lost, for the carcase often sinks immediately. It is obvious, therefore, that the supply is decreasing and all the game is becoming frightened. As an example he takes the walrus, which at the beginning of this century was very seldom seen on the coast except in the waters of the far north, and the seals off the Labdor coast are far more wide-awake than those of the Irish and Scottish coasts. The harpoon is, however, still being used as well as the gun in seal-hunting, according to what was told me in Nain in 1939. For this reason I was somewhat surprised by Reichel's information that already in the 1860's they had given up the practice of harpooning seals or taking sea-birds by means of darts.

Some Eskimoes have traps for cod-fishing, instead of hook and line.

The earlier kindling of the Eskimoes, which consisted of some pieces of pyrites and *Eriophorum*-wool, has completely given way to matches.

* * *

We do not need any more examples to draw the conclusion that among the Newfoundland-Labrador Eskimoes the whole complex of dwelling, clothing, food and equipment has been irretrievably scattered since the people came into contact with the Europeanizing culture, and with the modern means of communication there is scarcely any limit to its extension. People living in a hostile milieu will always take over the products of the factory when they serve their purpose more adequately than the tools of their own making. Yet, the Eskimoes are sufficiently conservative not to give way immediately to what is new. Only after a most careful testing has the older gear been exchanged for that of the new which was found more suitable for their hard battle with nature for the daily food. On the other hand, some of their old tools, which they found better than the new, have been retained.

The specific knife of the Eskimo women, *ulo* (633), for example, is still exclusively used among the women: there is, presumably, no European invention which could supplant it in its varied uses. Ease of manipulation as well as utility are always considered before an article is accepted and incorporated in the local cultural pattern.

One change, however, I find very difficult to explain as resulting in greater efficiency: the light and handy kajak seems to have been indispensable when the hunters were waiting for seals at the edge of the ice. If the ice cracked away from the shore and floated out to sea, the kajak could save them. But a heavy wooden boat covered with ice can scarcely be transported at the sinâ.

Notwithstanding the cultural metamorphosis the hunter is, in all essentials, still an Eskimo.

In spite of all these changes the Eskimoes' working life still follows its traditional rhythm determined by nature. The technical introductions do not affect the precepts or mores of olden days. The Eskimo still travels out to the trapping areas in the wooded valleys of the fiords where traps are set for the fur-bearing animals, and for the caribou-hunts on the mountains, or out to the sinâ on his dog-sledge drawn by a splendid span of dogs; cf. Figs 224 and 250. This his ancestors did already thousands of years ago and he and his children will continue to do it. On the forestless camping-places he still builds the winter snow-hut as has been the custom since time immemorial, and in this he rests between the hunts, till a new camping-place is sought out, and there, in a few hours, he sets up a new snow-hut. On the other hand, in valleys where there is plenty of timber and fuel, many Eskimoes have already built blockhuts which, in spite of their inadequacy considered as dwellings, greatly surpass both the snow-house and the sealskin tent. When the sea rolls free he places himself , with wife, children and dogs and all his baggage in his motor boat and makes this journey to the sealing and fishing places in a few hours, when before it would take days in a paddled umiak.

The changes which have occurred were necessary for the maintenance of their welfare in the struggle with competitors from the outer world. The specific Eskimo material culture connected with catching animals had already reached the limits of method and technique within their own possible development, it had — like the Eskimo language — become petrified over the whole of the very extensive area they inhabited. Then the Moravian Mission landed on the coast of Labrador, bringing new equipment and methods.



Fig. 234. Julius Nathanael on the look-out for caribou at Webbs Hill. Photo C.-G. Wenner, 1939.

The European culture was unyielding: it demanded assimilation or the extermination of the old.

The good shepherds of the Eskimo realized this at an early stage, when the stranger element began to force its way in, and they helped most considerably their protégés to break away from the charmed circle of inherited tradition and prejudice which usually prevents the savage giving up what is good for what is still better. For to change his customs and habits at a primitive

stage is indeed one of the most difficult things. Yet, if he does not manage to break away he is doomed.

As already shown, it is a long time since the changes began among the Eskimoes. Captain A. Crofton in 1791 gave an description of the Eskimo in southern Labrador which I give here for what it is worth (325): 'These came from the north in a large shallop [umiak] belonging to a tribe of 'Eskimaux Indians' and consisted of six men, five women, and seven children. They were to remain the winter with the English fishermen at Bradore and be employed in the seal-fishery. They brought with them some oil and whalebone to barter for English provisions, which they were very partial to, preferring European clothing to the sealskin dresses they formerly appeared in! They were so much civilized as to abhor raw meat [?], having cooking utensils with them. They had likewise laid aside the bow and arrow for musquets. The traders' agent said they were strictly honest and well-behaved. Of the Moravians they seemed not to have any knowledge.

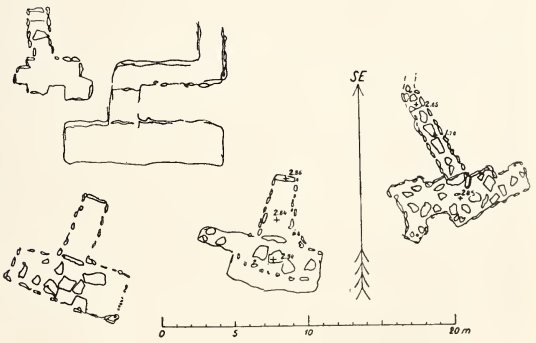


Fig. 235. Plans of varied types of Eskimo igloos at Hopedale dug out by Junius Bird Jr. and measured by E. H. Kranck and the author (cf. also 920).

We know nothing of the fate of these people, but we know that there are no longer any Eskimo south of Hamilton Inlet.

I think we may now conclude that there is no reason for pessimism concerning the future subsistence of the Eskimo of Newfoundland-Labrador, providing the hygienic conditions continue to be improved and he can go on earning his livelihood as hitherto. Meanwhile, one important circumstance must be taken into consideration and we will do that here.

The economic foundation of their life has also undergone changes.

The whole economic picture among the Eskimoes has undergone a complete transformation since trading-posts were introduced.

Since time immemorial the seal-hunting provided them not only with food, clothing, and boots, but with lamp-oil, window panes, thread, to mention only a few of the commonest things. In bygone times it also gave them products which they could barter for other things useful in the Eskimo household: seal



Fig. 236. Nain. Above the wharf are seen the Mission House and the Church toward the right and the Hudson's Bay Company's house at the left. At the edge of the park is the school. Toward the right are the Eskimo houses. Note the gardens. At the right edge some raised shores are visible. Cf. Fig. 199. Photo the Forbes-Grenfell Expedition, 1931.

train oil, sealskin and its products, such as boots, mitts, etc., slightly salted, dried fish, slightly salted or smoked sea-trout at the northern stations, and a smaller quantity of salted salmon at the southern stations. In certain years the fox skins were also important. Now, however, instead of barter *en gros*, the Eskimo is in contact with systematic detail trade. This brings the people a whole lot of modern and useful articles which before they had had to do without, just like so many isolated Eskimo tribes in the north to-day. These



Fig. 237. Hopedale. In the foreground Eskimo houses and some husky dogs on summer vacation. In the background the Church of the Moravian Mission and its business offices. Below the Church is the park. Cf. Fig. 328. Copyright WILMONT T. DE BELL, 1937.

new commodities enabled the Eskimo to develop and enrich his own and his family's life in many essentials.

The Moravian Mission, realizing these advantages, felt it a duty to find a market for Eskimo produce, and to keep a stock of things necessary for living and for hunting to barter to the people. The young men coming as recruits to the Mission station's staff were obliged to spend their first years behind the counter; in that way they had practice in the Eskimo language and learnt much of Eskimo character and ways of thought. It was no easy business. In the store the Eskimo always wanted more and more: I cannot think that you love me, he says to the storekeeper, as a last attempt at exaction (478).

The first aim of the missionaries' trade was to prevent the Eskimoes from falling into the hands of unscrupulous traders. Nearly everywhere when the

pioneer of the whites, the trader, has forced his way in among primitive peoples, the same traffic has been carried on, bringing ruin in its train: alcoholic liquor in exchange for furs or other products offered by the people. In Labrador, too, it is said that a drink of whisky for a fox skin was regarded as a good bargain



Fig. 238. Eskimo architecture at Nain. Photo the author, 1939.

for both seller and buyer. The missionaries, however, have succeeded in putting a stop to the traffic in spirits — at least in principle: on their initiative the regulation was introduced in Chapter 130 of Consolidated Statutes, Sec. 51: no intoxicating liquors shall be sold, given, or delivered to any Esquimaux or Indian under a penalty of 200 dollars.

When the missionaries had got so far they could begin to realize the second important point in their programme: the growing generation of Eskimoes

were to be educated to a competitive standard in which they could in all their ways of life meet the new period which must come to Labrador as to other places. And here I should like to repeat a statement by HUTTON, worth remembering when discussing this question: the missionaries worked on the imitative faculties of these people and trust that reforms will become habits; the Eskimoes do the thing you want from mere obedience so long as your eyes are on them, but, leave them to their own devices, and they slip back into their



Fig. 239. Eskimo house at Nain. Photo the author, 1939.

old ways at once: 'it is not a custom of the people' (476). The Eskimoes had to learn the demands made by modern trade upon both buyer and seller if they were to avoid economic slavery. Now the missionaries, of course, tried to make their own trading concern self-supporting. In this way they could also most easily teach their charges to see how profit and loss must be levelled out in the long run. They taught them that to balance the expenses the sources of industry should be as varied as possible and every branch of productivity developed to effectivity. The mission store had therefore not become only a kind of emporium, where the Eskimo could sell his products. It also encouraged the Eskimo to increase and diversify their products and paid fair prices for them. The missionaries lent them traps and seal nets; they supplied them

with ammunition. They avoided balancing the trade by debiting the products the Eskimo bought at too high prices, but helped them to develop and stabilize their economic situation. Let us for example consider the importance of the capture of fur-bearing animals. From what one hears in Labrador one has the impression that this industry was worked up to importance only by the intervention of the storekeepers of the mission. The Eskimoes, still during rather recent times, dared not make any long journeys into the interior of the country, so they were obliged to be satisfied with catching foxes near their homes on the seashore and in the fiord valleys. But they are so energetic that they have already been able to show surprisingly good results from even these restricted areas of capture; I was told for instance that they deliver many more coloured foxes to Hudson's Bay Company's factories than the Naskaupee Indians, who live in what is a special fox country. This has not so little importance in the Eskimo family's budget. In 1939, the value of the fat, skin, footwear, etc. which an industrious Eskimo family in Nain could produce was valued at 300 to 700 dollars in the year. To this must be added the occasional income from precious skins, but this is extremly uncertain, sometimes it will give a family only 100 dollars more in the year, in another year perhaps thousands.



Fig. 240. Eskimo women in the old clothing gathering sticks. (205.)

Yet the amount of products which the Eskimo can present for trading is not very large, and it was therefore rather difficult to balance his accounts. Trade was also more difficult because the giving of credit was unavoidable for purely humane reasons. The consequence was the same for the trade there as among other primitives: time and again a more or less considerable writing-off had to be made of the client's credit account. The mission has been much criticized for this. One cannot blame the rather cunning, but childish natives that they exploit the credit just as recklessly as many civilized business men, and that in this way they have made difficulties for the mission. Another circumstance which hampered the mission's trade was that both in theory and practice it was absolutely free from compulsion. The client received in exchange for his products flour and other ordinary things at reasonable prices, but if he was not satisfied with them he could have his money and seek another market, even if a man was heavily in debt to the mission store. It also hap-

pened that the natives deserted their benefactors and took the bait laid out for them by unscrupulous, strange traders in the form of rum, tobacco, or trumpery articles. However, during the winter that same individual and his family became chargeable upon the mission funds.

Yet all promised well from the standpoint of the mission, but then came the World War — catastrophe! That meant a break in the chain of development of the mission's practical educational work. As business men, the missionaries were perhaps not experts, but they had most honestly tried to undertake the general education of the people in ordinary life.

To the economic difficulties political complications were added. Originally the best relations had prevailed between the local representatives of the Moravian Mission and the Hudson's Bay Company, but soon a keen rivalry grew up (HAWKES). The result was that in 1925 the mission was obliged to lease to the Hudson's Bay Company — on very generous conditions from the company — the trade at the mission stations. The fate of the Labrador Eskimoes now lies in the hands of this trading company.

When primitive people are under discussion, it is quite usual to state that any change in their old habits and customs must lead to decline and ruin. Yet, from what has been related here, it ought to be clear that the Eskimoes in Newfoundland-Labrador continue to subsist on the resources of their own districts. And they also have earlier managed quite well with them, as is shown by the fact that they never need to experience any years of real famine such as sometimes ravage their neighbours the Indians of the interior and the whites on the coast. Some of my informers, officials of the Hudson's Bay Company, certainly did not consider that economic conditions among the Eskimo were very prosperous, but the more northerly of them lived in any case free of debt; only exceptionally have the Eskimo there required some assistance in the shape of flour, sugar, tea, etc. from the authorities, it was said. — There are, however, signs that the Eskimoes' earlier wealth is sinking, and in some parts varying numbers of them are becoming a burden on the public assistance authorities, like the settlers, e.g. in Hopedale (p. 506).

But whether the relative prosperity which must have prevailed quite generally before 1925 and still prevails in certain districts will continue, depends practically wholly on the organisation of trade. Since money economy with its extensive credit system has superseded an economy based on barter, and the consumption habits of the Eskimo have become so different that they do not even wish to go without the white man's food, it is quite easy for a man

having a trade monopoly to create a kind of economic serfdom among his clients by arranging prices. It is said that cash is an almost unknown commodity on the coast, and the price for the Eskimoes' products is given him in trade equivalents only!

The local population think that the prices for their products can only be justly regulated if free competition in trade is warranted. Here I shall content myself with stating this opinion. On the other hand, it is wise to remember that as production is very limited among the Eskimoes, it is a question of who will take the risks of competition.

A review of the changes in the material culture.

The marvels of modern times, which have caused other countries to move forward with giant strides, have left the Labrador coast practically untouched. For a long time the years passed with a sameness that necessarily marks a world which nature has hemmed in with a broad barrier of ice. Moreover, there is in every primitive people opposition to rapid cultural changes, and a disinclination to depart from the accepted way of living is customary. The Eskimoes of Labrador were also slow to change, and so the customs of bygone years continued to prevail for a long time (cf. 476).

The material culture now represented among the Labrador Eskimoes is no longer of the primitive type which met FROBISHER when in 1577 he sailed along that coast, and not even that which met the first Moravian missionaries when they landed in 1752. The hunting nomadism was certainly then in principle the same as now: from certain groups of igloos excursions were made in different directions and the families accompanied the hunters. The whole summer they are generally rambling up and down the coast, CURTIS wrote in the 1770's (196). They used the umiak for their summer migrations, that flat-bottomed, square-ended boat of drift-wood and seal hide in which the women moved the children and dogs and equipment from place to place, while the men travelled in lordly fashion in their kajaks. If food ran low, the families had to separate, the men went in their kajak to track large game, while the women and children in the umiak were given the task of searching the shores of the islands for anything edible. The results of their hunting were relatively small because of the gear of those days, and the igloo groups had always to be on the move. The yearly cycle can be supposed to have been in the main the same as now, but their occupations were stamped by considerable irregularity. The people were wild in the real sense of the word. Other countries advanced in material culture, but the Labrador of the Eskimoes long stood still.

Then the missionaries came. Small fixed centres were formed. Decisive changes took place in morals and education. Even the housing became different. Changes also occurred in the life connected with hunting and trapping. A review above of the whole complex of changes leaves the impression that the new accomplishments have not only been advantageous to the Eskimoes in making life easier for them, but have also here as elsewhere become the foundation for increased efficiency in economic life, which is, of course, the demand of the day in Labrador as elsewhere in the world, if one is not to be handicapped in retaining his position among his competitors. But here it may be objected: how is it with the Eskimo themselves? Do they still remain a nation of hunters?



Fig. 241. Eskimoes at Ryan's Bay. Photo the Forbes-Grenfell Expedition, Aug. 1931.

There is some misunderstanding among the occasional visitors: the nomadic hunter has gone, the Eskimo of the present day is a villager, they say.

This incorrect notion of their ways of living goes far back in time and has been frequently repeated. Hind wrote about 1860 that the object of the Moravian Brethren was to collect the Eskimoes in villages around them and, besides instructing them in the truths of Christianity, seek to teach them those simple mechanical arts which may contribute to their comfort and wean them from the wandering life to which they are so prone. This last is an important misunderstanding, because as early as 1860 Reichel, who was a most prominent Moravian missionary, wrote (787 a): it is evident that the Eskimo must for ever remain a huntsman and fisherman. In this way alone can he obtain a livelihood in his sterile country.

We let Dr Hutton, with his expert knowledge of these people, answer this question (476):

In the village, in the ships, in the presence of foreigners their native ways are not much in evidence. The casual summer visitor sees the Eskimos in European clothes, curing codfish, they see them drink tea and eat biscuit that they have bought from fishing schooner folk from Newfoundland in exchange for skins and sealskin boots. They think the Eskimo has gone and may exist only in the icy solitudes of the Arctic. But that is a mistake. You must see them at their seal hunting and you will find that the Labrador Eskimo still is an Eskimo to the core. And he is perhaps a more successful hunter

than his ancestors the witch-finders, he does read and write, he is able to inform himself of all the modern instruments for chase. Peoples who have lived among them for a good many years, who speak their language, who have travelled with them and base their opinion upon what they have seen themselves, report that the Labrador Eskimo is still a kind-hearted, openhanded, raw-meat-eating Eskimo. He is no less a Christian because he sucks blood from a freshly killed seal. At these latitudes the aboriginal hunters are almost like pure animals: to eat or to be eaten. And you will therefore see the hunter slit the seal's throat and suck its warm blood. That heartens them, that keeps the cold out. The hunters are Eskimoes yet.

Even to-day (1939) we find that in general most of the people live in small groups in more or less distant bays and sounds and only come to the stations for the festivals or for Sundays in the summer. They still like to depend on hunting for their income, and are still the semi-nomadic hunters of bygone days. For their mental ability this is very important (303 a).



Fig. 242. Eskimoes in their kajaks, Ryan's Bay. Photo the Forbes-Grenfell Expedition, Aug. 1931.

It is most interesting to learn that it is in reality the Moravian Mission that has kept the Eskimoes true to their tradition in their ways of livelihood. They soon came to the conclusion that the hunter's life is the ideal life for an Eskimo. The strenuous fight of the Moravians to protect their charges has been waged not only against the ignorance, superstition, evil practices and primitive religion of the savage but also against the sins of the so-called civilized people. When the tide of immigration swept up the coast it brought with it most of the evils of the outer world. The missionaries recognized the danger and endeavoured to keep the Eskimo to the food and the mode of life which had sufficed them since olden times, and which they knew would give them a better chance of ultimate survival. But civilization is insidious: the Eskimo learnt from the invading whites to like coffee, flour, tobacco and strong drinks, not good things for a constitution accustomed to blubber and raw seal meat, which they had loved to gorge upon in earlier



Fig. 243. Modern Eskimo dandies at Nain. The expedition ship in the background. Photo C.-G. WENNER, July 1939.

days, writes PRICHARD. Yet seal meat still ranks in the Eskimo mind above all these things as food and a delicacy.

One has said, and no doubt rightly, that were it not for the farsighted and heroic work of the Brethren there would not be a single Eskimo on the Atlantic coast of Labrador to-day; the composition of the population towards the south from Hamilton Inlet may prove it (761; cf. 614). In this isolated wilderness they have in silence carried out a task of human love of inestimable value for the native themselves by carefully and slowly bringing them into contact

with modern civilization, while at the same time persuading them to preserve the valuable characteristics in their own material culture. Christian culture can rejoice over this victory. The civil administration has again in this way received a firm foundation on which it can build if it so desires.

Changes in the sphere of non-material culture.

Having illustrated the metamorphosis in the Labrador Eskimoes' material culture with some isolated examples, it may be interesting to read some



Fig. 244. Eskimoes at Hebron unloading firewood (577).

statements which throw light upon the radical changes in the sphere of non-material culture. The romantic glow of a golden age which is usually thought to envelop the life of the natives will pale considerably.

In order to obtain a background for these changes, let us remind ourselves of some traits in the spiritual and social life of the Labrador Eskimo in olden times. For this a prime collection of examples is to be found in the Moravian diaries from Labrador. The old seafarers and traders down to CARTWRIGHT (see Bibliography) give many hints about the Eskimo on the Atlantic coast. TURNER (963, 965), who knew the Ungava district so well, has left a description of the northern Labrador Eskimo in the 1880's, and in this there is also some information about their beliefs as to the hidden powers controlling man's fate and to which we ought to devote some attention.

The spirit world of the pagan Labrador Eskimoes.

The pagan Labrador Eskimoes considered that all phenomena and events in life were dependent upon the actions of certain definite spirits. Each of the spirits could determine things regarding his special creation or thing. According to what TURNER and HUTTON found there were spirits of different ranks: spirits of a lower order under the rule of a great spirit. The most important spirit of the sea, for instance, was held to be an old woman, whose home was at the bottom of the sea, but who used to come up to breathe on the shores;



Fig. 245. The starting of the fishing-party from Hebron, July 1937. Copyright WILMONT T. DE BELL.

all living things in the sea were under her control. Thus the demonology was very extensive.

The idea of a good spirit did not enter the old Eskimo's minds; the spirits of their pagan life were all ill-disposed and apt to sulk, they would hinder their hunting and cast an evil spell over them. Therefore the spirits, the powers of mighty ill-will, beings of malice and cruelty, must be appeased. Some chosen men met to approach the dwelling of the principal ghost, the *Torngak*, in the gloomy mountains. They took with them offerings of clothes, food-stuffs, etc. in order that his anger might be quenched at least for a time (476). The great spirit of the sea too had to be appeased; if not, she could make the seals avoid the hunting-places of the Eskimos. She could feed the codfish and make

them lie fat and sluggish while the fisherman plied his hook and line in vain. Broken knives must be sacrificed, bits of meat, etc. and cast into the water for the old woman that she might be in a good humour (476).

It is worthy of remark that some of the personalities in the spirit world had changed roles among the Labrador Eskimo. *Tornarsuak,* the great spirit who had taken the form of a giant polar bear, and was supposed to live in a cave on Cape Chidley, and the other great divinity, *Superkugssuak,* the old woman who was said to live at the bottom of the sea and control its inhabit-



Fig. 246. The Eskimoes' modern fishing motor-boat, Cut-throat. Photo C.-G. Wenner, July 1939.

ants, and before whose demons the pagan Eskimoes trembled, had opposite functions in Labrador: on the Atlantic coast Tornarsuak ruled over the sea animals.

Under special circumstances a certain spirit was materialized in the form of a doll which one carried about hidden under one's clothes, and the doll's assistance was called upon when difficulties arose. If the materialized spirit was unable to help the hunter, it had to be punished. If this did not help, the last resort was to transfer it to a fellow creature, but this must be done without the knowledge of the receiver. Not until he had rid himself of the unwilling spirit did the hunter succeed in carrying out his task. Against the bad temper of the spirits it was good to wear charms, as for example against

the spirit of rheumatism; tattooing was a protection against the evil powers.

Every living creature in the world was accompanied by his special spirit. This spirit was united with the body, but when the body was lost by death, the spirit released itself, for it was indestructible. Like most children of nature, the pagan Eskimo were thus firm believers in a life after death. Their idea



Fig. 247. Eskimo fishing-party on the outermost coast off Cut-throat. Photo C.-G. WENNER, 1939.

was like that of the Happy Hunting Grounds, with the difference that the best hunting ground to their ways of thinking is the sea.

This is made clear by the method of burial. Moss-grown heaps of stones mark the grave which was just an oblong rough masonry of boulder stones; the people know nothing of digging because the soil is not deep, scanty, and often frozen. The place was chosen on a lonely cape or height, as I found on Fermoy Island for instance, so that the hunter could overlook the sea. Under the stones lie the hunter's remains. Heavy flat stones were laid on the top of the pile to keep away dogs, foxes, and wolves; in the cold, pure air the bones are preserved from decay for a long time. At the head of the tomb in many graves under a separate little heap of stones lie the hunters tools etc.: arrows, harpoon, fish-hooks, stone knives and stone-headed axe, his lamp of soapstone, cooking-pot; this equipment

tells of a people who lived in the Stone Age long after the discovery by white man. In some graves, in which the bones have turned to dust, the woman's knife, *ulo*, and the skin scrapers tell that a woman was buried there, and a little child's bulging grave is marked by the childish toys piled up in it. The people seem to have believed that the future life would be like the present, and they wanted to have their tools in it. In the Eskimo graves on Labrador we thus find the same trait as for example in the graves from the Iron Age of the Varanger Lapps in the most northerly part of Fennoscandia; in these, too, gear and tools were placed, but destroyed first, they must be 'killed' for the dead can, of course, only use things that are also dead. In a child's grave the Eskimo sometimes considered it was useful to place a dog's head: children are rather lost when they come into unknown parts, so they thought the dog's spirit could show the child the way to the dwellings of the dead.

The clever hunter was believed to be happy in his grave. His great adventure had begun, he hunted every night. Many had seen his footprints in the snow. — Often have the Indians profited from this superstition, says TURNER; they plundered the graves. I have looked into many an old Eskimo grave; they have all been plundered except for the bones, but in one grave near Hebron I found a little copper amulet. When the Eskimoes later noticed that the articles had disappeared from the graves, they were absolutely convinced that the spirit of the departed had really taken the objects and definitely started out on the long journey to the dwellings of the dead. It was not necessary to fear that the spirit would begin to haunt them if it became angry.

The existence of these hunters of the nether-world appeared in local beliefs until quite lately. The Eskimoes would not live in a house where a death had occurred, believing that the spirit of the departed would haunt the place (995).

Every animal was also supposed to have its special spirit. The spirit of the animal was like that of man, but belonged to a lower order. Nor could the animal's spirit be destroyed; if an animal was killed, its spirit abandoned it but continued to live as a spirit and in time became re-incarnated. For this reason it was not necessary for the hunter to limit his activities, the number of animals could never be decreased in however great numbers their bodies were slain. The animals' spirits also were after their kind under the rule of a greater spirit. The spirit of each caribou, for example, obeyed a powerful spirit who took the form of an enormous white bear, and it depended on this spirit's goodwill whether people would be able to kill caribou in the future when they required its flesh.

When a person wished to approach a spirit with a request, it was necessary to observe a great deal of ritual, otherwise the spirit would be incensed. For this reason there was a functionary, the *angekok*, the shaman, who was the intermediary between mankind and the spirits (see below); only the angekok

could get the great spirit to send the caribou to the humans when they needed food, but on his side the spirit made many demands for expressions of reverence from the people, and he had often to be pacified. If an accident happened,



Fig. 248. Eskimo trapper dwelling in Fraser River Valley. Photo C.-G. WENNER, 1939.

e.g. if the dogs had found a chance of gnawing at a caribou's thigh bone, the great spirit of the caribous was offended and might perhaps in the future refuse to send more of the animals to the hunter. It was still more unfortunate if the dogs had got at the caribou flesh. As compensation for this it was necessary to cut off a bit of the tail of the guilty dog or clip its ears, for blood had to

flow: — in this special way the guardian spirit of the caribou spirits could be propitiated.

A special class of spirits ruled the great objects of nature: the sea, the land, the clouds, the wind, etc. Every bay, cape, island, etc. in Newfoundland-Labrador has had its special guardian spirit. This class of spirits obeyed the will of the great spirit called *Torngak* (cf. above). Torngak was no less than the spirit of the dead (965). He would worry and trouble people so that they should tire of their existence on earth and their spirits desire to move over to Torngak and live with him. For this reason he attacked people of all ages; hunger, disease, and death he sent out to catch the desired spirits of mankind and bring them to him.

The ordinary person, as already indicated, was not worthy nor able to have direct contact with the spirits, and their relations had to be entrusted to the angekok.

Anyone could obtain for himself the qualities of an angekok. An Eskimo who felt urged to it could, by fasting and abstention from contact with other people, obtain for himself the supernatural powers of the shaman. These abstentions made it possible for him to learn the great secrets of Torngak. He therefore lived for some time alone in the wilderness. When Torngak got to know this, he pitied the lonely one and took him up into his fellowship. Now he entrusted him with the great secrets of how to maintain life, to drive out the evil one who caused death. In time the disciple himself became a conjurer of spirits, the angekok. When he had entered upon his vocation he returned from his retreat to his tribe and told people what he had seen and done and how he was now prepared to fulfil his mission among them. When someone came and wished to have his services, the angekok let them understand that he was entitled to compensation for them; and he was not at all uncomfortable in saying right out that the greater the compensation the greater would be the effect of his arts.

The hunter was very often obliged to ask advice from the angekok. He was the oracle of the weather and hunting. A great conjurer was believed to possess amazing powers. It was he, for example, who could compel a large number of game to find themselves just in the district where his village group were planning to hunt. To achieve this it was sometimes necessary that the angekok hung a magic doll or a stylized image of some famous hunter or angekok on a staff at the place.

The client had to obey the angekok blindly. The Labrador angekok's rule was one of terror, Turner considers. As time passed, he says, the shaman therefore became more and more exacting and impudent. If one got on bad

terms with the angekok, the only possibility to avoid his often really idiotic ideas and bluff or revenge was by fleeing from the camp and abandoning the hunter group in which one had grown up.

This can be illustrated by a quotation from HUTTON: The dreaded sorcerer stalked in, a weird and filthy fellow, bedaubed and betasselled. A silence fell upon the company, the people sat around in the dim and smoking light of a seal-oil lamp, talking in undertones. As the sorcerer spoke, a silence fell. He trumped his seal-hide drum and began to chant in a nasal voice. Maybe he had a grudge against some unhappy fellow: There is the fellow, he sings, who is making the storm. He forgot to give me meat when he caught a seal, and the spirit of the storm is angry. You will be hungry. The strong hunters trembled (475). —



Fig. 249. Eskimo summer shack in the skerry fence near Makkovik (536 a).

The angekok was also the doctor of the camp, and it was believed he could restore the sick to health. In doing this, he did some very curious things. For example, a patient with fever was laid on the ground and the magician worked himself up into a condition of mad rage and began to drive out the evil spirit who was supposed to be causing the illness. CARTWRIGHT speaks of the shaman's séances. The magician threw himself in holy desperation upon the patient and by kneading began to chase the evil spirit from the place where it was to another spot, and so the kneading continued. The sick person got blows of all kinds, shoves and jerks, while the shaman gave voice to the most horrid yells and hideous cries. After a while he declared that the victory was won; the operator stated that he now held in his hand the spirit who had caused the illness. If, however, it escaped from him again, and again got into

the patient, which was shown by fresh pains, the angekok began his cure again and went on with it till the patient got well or died. If the patient died, well then, the cause of death must be something which was not under the control of the shaman: a sudden appearance of a colour shade in the flaming Northern Lights, a sudden snow-fall or some other alleged tool in the hands of the evil spirit which had succeeded in escaping from the magician was concocted *ad hoc*. To pacify the spirit the shaman sometimes recommended that the tail of a living dog should be cut off, and it is said that many dogs ran about the camp mutilated at the order of the shaman. Turner (965) states that a greater rascal could scarcely be found in the Ungava region that the shaman Sapa, who was as impudent as he was famous, and was still alive at that time.

From what has been said we may conclude that when the white man came into contact with the Labrador Eskimoes, they met no free sons of the wilderness, but terrified wretches of a world full of unfriendly spirits and trembling under the terrorization of the angekok. It seems that the angekok in Labrador could drive them to do whatever he wished, like a crowd of resistless animals. Sometimes in descriptions of the medicine man's feats we find an outbreak of pure madness, and from this we see to what an abyss of terror and suffering superstition had opened the way among these Eskimoes. It was the Moravian missionaries who, in the face of danger and privation led them away from this misery with loving hands and tactfulness.

Some notes regarding customs and habits in pagan days.

Turner (965) relates a good deal of the customs and habits among the nearest neighbours on the west, the Innuit at Ungava Bay. The social conditions which appear in this description must be considered as existing among the Innuit of the East at an older period of time and, indeed, when the missionaries first came among them.

Married relations bore the impress of might being right. The man who had the power took as his wife whoever he wished and had as many wives as he could. It is said that girls were often married before they reached puberty. They were not very particular about kinship, though MacGregor mentions that brother and sister marriage did not take place. But according to Turner it once happened that a son took his mother to wife; as, however, the other hunters urged him to give up the connection, he agreed and took instead two other women.

Thus the inclination to polygamy was general, and the reason was purely one of convenience: the more wives a hunter had the better he was served

in the camp. When a missionary once reproached an Eskimo for having increased the number of his wives, he answered — not the least disconcerted — that he needed them all to man his boat.

The woman was in every respect subject to her husband; if she was disobedient or neglectful she was thrashed until she improved; the custom of the people is still for the wife to follow, and she follows, in public the husband must be the 'boss'. On the other hand a model husband has always been affectionate, kind and faithful, a smart hunter withal, well able to keep his little household in proper Eskimo plenty, says HUTTON. — It has been said that polyandry prevailed among the Labrador Eskimo because of the lack of women, but I have been unable to find any support for this statement.

Through the influence of the missionaries marriage relations among the northern Eskimoes have changed and the wife's position has been improved in certain respects. In 1905 there was only one man who lived in pagan style and had two wives, and that was in Killinek, according to MACGREGOR. As far as I know polygamy has now completely disappeared from among our Eskimoes. The old savage mentality has also been very much tamed.

Sudden outbreaks of rage were the expression of the strongly asocial predilection which distinguished the Eskimo societies; there was lust and greed and hatred, bitter feuds and no forgiveness, sometimes even murder (475). If things came to such a pass that there was murder or manslaughter it had to be avenged; and with this aim in view the other men watched for an opportunity to surprise and kill the murderer, usually by stoning him; this was the established custom, and those who took part in it made no secret about it. According to their code of honour it was the duty of the murdered person's nearest relative to avenge him. The crippled and the infirm were treated without pity, TURNER says; if they became dependent on others they were simply got rid of by suffocation or left behind to die alone when the camp was moved to another place. The dead were treated most unceremoniously.

CARTWRIGHT, in 1792, mentioned that the Eskimoes were fond of a game of ball. All those of the west were at the time of his visit much given to pleasure and amusement, says TURNER; games of many kinds had been preserved among them from olden times. The love of gambling and card-playing are still common among the natives; sometimes they play every night in the huts; both sexes loved games of chance to such a degree that they could even risk their own lives. It happened sometimes that a woman gambled on her only dress and nearly all her other rags rather than be left out of the game. Feastings were frequent in the huts. In 1777, according to CRANTZ, the Eskimoes

near Nain had a temporary winter club house (public gaming-house or pleasure-house; cf. the old promiscuous tent) sixteen feet high and seventy feet square, built wholly of snow; in this they collected on festive occasions, to the horror of the missionaries. Nowadays gambling and card-playing are said to be much less prevalent.

These happy savages, however, were a danger for the white man who wished to exploit the resources of the great wilderness. When reading older descriptions, one has the impression that the Labrador Eskimoes, a century and a half ago, could be reckoned as North America's most dangerous and asocial savages, who were the cause of very great difficulties for the British Colonial Government. After DAVIS some other seekers of the North-west passage: HALL, HUDSON, BUTTON, GIBBONS, KNIGHT, and others tell about the Eskimoes of northernmost Labrador or in Hudson Strait. They had all the same story: friendliness first, then attacks. GOSLING exclaimed: the Eskimo seem to have been the Ishmaels of North America, — their hand was against every man, and every man's hand was against them. The Eskimoes were then fierce and treacherous, if strangers came to them the process was a short one: KNIGHT, in 1606, sent a boat ashore and seven men were immediately murdered; the Moravians who landed south of Hopedale in 1752, disappeared without leaving any trace, clearly murdered in ambush (cf. 205). By a show of friendliness they would entice men from the fishing vessels ashore, and later attack and massacre them with merciless ferocity. Their habit was to rise from their haunches, utter in unison a mournful cry and fire off their guns. It was this cry which terrified and frightened away the fishermen in the 17th and 18th centuries.

The Eskimoes had lived at war with the Indians for generations, and cruelty and treachery had become part of their very being. It might be said that these 'savage heathens' later had followed the example that Christendom had given them. The white invaders had so to say only educated the Eskimo to self-defence, and in this was included the overawing of their enemies by cruelty. Both the Indians and the whites had, at least since the 17th century, forced them to hold the view that every moment they must be on the watch, yet the causes of this must be still older. The Icelandic sagas tell how, as early as about 1000 A.D., TORFINN KARLSEVNE slew many natives on his Vinland journey and kidnapped two Eskimo boys (920 b). In 1501 GASPARRO CORTEREAL kidnapped 57 Eskimoes to test their suitability as slaves in his homeland; it was a kidnapping in the direct manner analogous to that of collecting for a zoological garden; — in this humane way began the study of the natives of North America ILWRATH wrote (606)! SETTLE (848) writes in 1577: At the sight of our men the people fled, we tooke one, and the other escaped. Seekers of the northwest passage tell about the Eskimoes of northernmost Labrador or in Hudson Strait.

— Their hand was against every man, and every man's hand was against them. In the 17th century it is said the French started a systematic extermination of the Eskimo in their most southerly district by supplying the Indians with firearms and egging them on against the Eskimoes, who can not indeed have been very difficult according to what has here been described (p. 480). The Eskimoes were, however, bold and courageous: 'When the Eskimoes come on board, the sailors go right on to the forecastle with guns, bayonnets and cutlasses', is a description given at the end of the 18th century; if the Eskimoes discovered the French flag on a vessel they seem really to have run amok (205). Repeated bloody fights took place between the trappers and the traders on the one side and the Eskimoes on the other.

When one knows how rapidly a rumour spreads and how long the memory of unusual happenings can live among primitive people, it is not to be wondered that the Eskimo suspected all white invaders and expressed it in many kinds of horrors with a view to preventing their coming again. It seemed to them quite natural to murder the white encroacher at once rather than be murdered by him.

— It was impossible for us, PARRY (44) says in the report of his second voyage, not to receive [1821] a very unfavorable impression of the general behaviour and moral character of the natives of the entrance part of Hudson Strait, who seem to have acquired by an annual intercourse with our ships for nearly a hundred years, many of the vices which unhappily attend at a first intercourse with the civilized world, without having imbibed any of the virtues or refinements which adorn and render it happy. The same thing seems to have struck LYON in 1824.

At that time, it seems, reconciliation between peoples was not thought very highly of; yet voices demanding a better understanding of the Eskimoes were not lacking. The unknown author of the »Memoir concerning Labrador, 1715—1716» (325) made the following interesting statement: The Eskimoes are considered extremely savage and intractable, ferocious and cruel; they flee at the sight of Europeans, and kill them whenever they are able; but I believe they fly from Europeans because they have been maltreated, fired on and killed, and if they attack and kill Europeans it is only by way of reprisals. — — — Messieurs JOLLIET and CONSTANTIN [cfr the Carthography annexed p. 899] who had visited them, had received a thousand tokens of friendship. M. COURTEMANCHE (p. 480) said, that they are good, civil, mild, gay and warm-hearted men and women and that they danced to do him honour. They are very chaste, dislike war. . . are more timid than savage or cruel. . . there will be no difficulty in civilizing them if proper means are taken: to forbid the savage Indians to make war on them, to forbid the French fishermen to fire on them or to offer them any insult, or to sell them any intoxicating liquors. . .

However, the Eskimo band on south-east Labrador numbered about eight hundred and they had firearms of various sorts in their possession; it was supposed that some Europeans had taken up their abode with them. They were much dreaded by the white for their robberies, which were often accompanied by murder. COURTEMANCHE also had much trouble with them.

Peace or a sword was the alternative which the British government was forced to lay before the Eskimo. Then the Moravian Brethren stepped into the breach and saved them from themselves.

It was fortunate for all parties that Newfoundland and Labrador at that time had an unusually wise governor, Sir HUGH PALLISER. He gave the Moravians an opportunity to try the first alternative before the musket and cutlass were used by the naval forces. It was not an easy task; the white voyagers to the Labrador coast, as elsewhere, had certainly treated the natives abominably, and their cruelty had fostered cruelty and treachery amongst the Eskimoes. PALLISER was right. It needed only that the missionary JENS HAVEN met the Eskimoes, talked to them in their own language, before the 'vilain Huskies' cried: Our friend is come (205). The herd of barbarous savages was already in 1773 found to be in a fair way to become useful subjects (196). The savages were slowly tamed, war and murderous reprisals passed away for ever from the coast (761).

The educational work of the Moravian missionaries has certainly caused the psychological attitude of the Labrador Eskimo towards the great questions of human life gradually to undergo a cardinal change. It is therefore most interesting to see how their religious views of their local world have altered in a comparatively short time. They have absorbed the articles of the Christian creed and its social ethics surprisingly quickly, and as far as is known, they have ceased to bow the knee to the heathen divinities. Their receptivity in the sphere of the non-material culture has been as great as it was in that of the material cultural. Even the language has been modified, partly because new conceptions have been introduced by the foreigners, partly because the missionaries and the traders could not learn to pronounce the difficult guttural idiom of the natives, so that the latter have gradually adapted their pronunciation to suit the newcomers.

The struggle between Christianity and superstition.

About 1860 there was something like 200 pagan Eskimoes in Newfoundland-Labrador (787 a) out of an estimated total of 1500, of whom 1163 belonged to the Moravian mission. At the beginning of the present century it was said that there were still some thirty pagans in Eclipse Bay far away in the North on the coast, and in 1905 there was one pagan even in Hebron (604). Nowadays there are no more pagans.

The missionaries have had a hard and varying struggle against the angekoks and the spirit world of the Eskimoes; I refer the reader to DAVEY's instructive work: 'The Fall of Torngak.' The struggle between belief and superstition is generally a long one among primitive people. The Labrador

Eskimo have also long preserved flashes from the superstition of olden times.

TURNER, in the 1880's, considered that the conversion of the nomadic Ungava Eskimoes was only apparent, for as soon as they got away from the watchful missionaries and their influence they placed themselves again under the direction of their shamans; it was in any case, they thought, the angekoks who since time immemorial had caused the spirits directing the life and movements of the seal and the caribou to let these herds move towards the hunters when they went out to kill them.

It was said among the Eskimoes at the beginning of this century (577), that while it was not possible to know exactly how ideas were connected with reality, it was best to be careful, not to forget the old spirits for the sake of the new divinities. It might happen for example, that the spirit that lives in the moon is of course comparatively well disposed according to the old belief, but at an eclipse of the moon it was still considered to be safest in any case to make the spirit gracious by cutting off a little of a dog's ear for her; this must in any case be done when the Northern Lights are flaming blood-red, for this spirit is then in such a humour that it could send misfortune if not propitiated in time. People earlier also protected themselves with amulets or tattooing against the spirits. But tattooing has gradually died out: HUTTON saw one of the last tattooed people at the beginning of the century at Nachvak.

PERRETT stated at the beginning of this century that the natives of Killinek certainly still believed in Torngak. The only one who would tell him something about this spirit, said: Torngak still plagues me, though I have renounced him. He wants me to go back again, but I won't go. The other Eskimoes don't tell me they are still worshipping him, but I feel it inside me when they are in connection with him (478). In 1910 the missionary WALDMANN in Killinek (989) said that the Eskimoes suspected that he was having secret telepathic connection with their hereditary enemies the Indians. Their fear of *allat* (= Indians) was then still very great. They believed that allat could pluck away the fish out of the net while the Eskimoes slept.

However, not many traces of superstition still linger, HUTTON reports at the beginning of this century. But going in and out among them he found a few, especially connected with the hunt (476). A young man became very frightened, he relates, when he had caught a fox with a peculiar mark: I shall die soon, he said. They are now also afraid of the presence of death; sometimes they dismantle the whole hut where a person has died and build it up from the same material elsewhere. And HUTTON concludes: The fears and fancies of the old times have scarcely passed away. For instance, in the night, the people are fast asleep, but they like to keep a light burning; like children they are timid in the darkness; they superstitiously dread some vague and malignant power. Most interesting is that some decades ago they still feared to be photographed; they believed their spirit would be caught in the box (= camera), HUTTON noticed when he first came to Labrador.

Since the missionaries succeeded in getting the people to retain their nomadic way of living the contact between them is no longer the unbroken one of the older days. The nomads now have much freer possibilities of testing things than their forefathers had when the missionaries began their work and their charges lived a long time at the station. It would be astonishing, if, when the nomads are left alone again with nature and their traditions they should not give way to the temptation of seeking re-insurance for their welfare from the old spirit world too. This has proved to be the case, and even in our days the angekok has not yet completely disappeared from the consciousness of the people. Here and there the old ideas peep out again and reflexes from the past can temporarily fill the Eskimoes with enthusiasm. For example they are sure that a mad person is quite simply possessed by an evil spirit. Then they can be caught by mass suggestion and, relying upon the angekok's old mishandling, they try with blows and slaps and other bodily means to drive out the devil; this happened still in 1939. Not long ago, WALLACE noted, in 1906, the wife of one of the Eskimoes in Ramah was taken seriously ill and became delirious. Her husband and his neighbours, deciding that she was possessed of an evil spirit, tied her down and left her until finally she died, uncared for and alone, from cold and lack of nourishment (995). It seems that anyone, at any time, can be driven into such excesses, however bitterly he may have regretted it after an earlier action of this kind. From this and other facts one has the impression that the Labrador Eskimoes are distinguished by an extremely over-excitable mental life which reacts very easily to small impulses in an abnormal way.

In normal cases, however, the angekok's bluff has lost its authority; scarcely anyone now believes in his instructions about sacrifice. His old trick of recommending the cutting off of a dog's tail or a dog's ear for the purpose of curing a patient has fortunately gone out of use; I looked very carefully at the dogs but never saw one with a mutilated tail. From what I saw and heard in Labrador it may be safely said that among the Eskimoes of the Atlantic coast the Stone Age animism has practically ceased to exist and they have become mild, sincere Christians. 'Wild' Labrador Eskimo are scarcely to be found anywhere except perhaps on Belcher Island in Hudson Bay among those who trade at the Hudson's Bay Company's station Great Whale River.

The slow transformation of the Eskimoes both in their mental processes and customs is most impressive. Any other missionary undertaking would do well to imitate the proceedings of the Moravians in Labrador. Even with regard to the transformation of their mental ability it may be said that a miracle has been wrought. The missionaries have systematically educated the



Fig. 250. Husky dog at Nain. Photo C.-G. WENNER, 1939.

Eskimo both spiritually and in worldly matters and thus prepared them to receive the blessings of western European civilization.

THE BLESSINGS OF EDUCATION.

In the olden days education meant amongt the Eskimoes that the parents were training their children for the practical demands in the hunter people's life. In all their games the children were chiefly training hand and eye. Above

all the Eskimo boy likes to feel himself a hunter. This fashion still prevails. Dr HUTTON saw the boys use the crossbow to kill birds for dinner, and boys of thirteen or fourteen went up the valleys with real guns hunting hare and ptarmigan. They enjoy an imaginary seal hunt with harpoons.

The puppy dogs are always handed over to the boys, it is training for both boy and dog, for the boy uses all the tricks he has seen his father use in driving the big sledge. It is said that only one who has tried to drive a team of Eskimo dogs can know what a stock of patience and perseverance the child must have to teach the puppy to keep its traces tight and to know and obey the words of command. These adventures are commonplace to them. One says that a well-trained dog team driver is strong enough to strike a dog with a single blow of the whip from the full length of the lash of thirty feet of hide. These powerful, quarrelsome and half-savage animals — Figs 250 and 224 — must be kept under absolute control by the formidable Eskimo whip. With his short-handled whip the driver can not only touch any dog he pleases, but can flick a fly, drive in a nail, or kill a willow-grouse with a turn of his wrist (761). To be a good whipper is the highest ambition of the young men of the rising generation.

The mastery of a boat seems to be another of the Eskimo's inborn gifts. He is often on the water by himself before he is three years old, lugging away at the pair of oars. Soon he learns to respect the waves, the wind and the currents between the islands.

Thus the children educate themselves at this point. The boys are petted and pampered far more than the girls. There is no such thing as punishment in an Eskimo household. The children hear few harsh words. The little boy still grows up like his father once grew up; he has the same pose, the same way of holding his hands, in everything and especially in little mannerisms he is his father over again (476). But nowadays he acquires other faculties too.

Times have changed. Nowadays life demands more of Labrador children. The mission therefore teaches the children in a school at the mission stations during the winter months. The children begin to attend after their sixth birthday. Usually the smallest are taught by an Eskimo, later the schoolmistress or the missionary himself takes them in hand. Many of the teachers were once Eskimo children and have learnt from the missionaries to present things in a way that the Eskimo child can grasp; at the present time professionally educated schoolmistresses come from England and the Netherlands to teach the children (476). The success of the schools has been astonishing. MCLEAN (610) was, surprised already in the 1840's to find even all the Eskimo half-breeds far from the mission stations able to read and write; the task of teaching devolved upon the mother or a neighbour mother, because there were no schools or schoolmasters. Here we see the far-reaching and good effect of the work of the Moravian missionaries, he says.

There is no time for the schoolmistress to mope and feel lonely, Dr HUTTON remarked during his stay at Okkak, she had to dispense with all ceremony and follow the customs of the land and its folk. The first thing was to learn the language of her pupils, and this is not at all easy; the Eskimo says: Kablunak [white man] has a different mouth from the Innuit. I once asked the Rev. PAUL HETTASCH if he considered that he could talk Eskimo perfectly. Not at all, he answered, I have spoken it for thirty-seven years, but I am not perfect. My daughter on the other hand who was born here, should I think, speak it like an Eskimo. HUTTON says that the language has, however, one immense advantage: it is beautifully grammatical, governed by plain straightforward rules, with only a few exceptions. The remarks made by an Eskimo are said to be always applied literally (476). In practice the words are almost ludicrously long — twelve, fifteen, seventeen syllables, and built up bit by bit according to a pattern that can be learnt and understood, like chemical formulae. It takes some time for a foreigner to be able to talk freely with the people; the learning involves a prodigious feat of memory too, there are so many words for the same thing under different circumstances and the many-syllable words are built up by putting in all kinds of tags and bits between the unchanging roots of a verb and its grammatical expressive endings: e.g.: *tikkipok* = he comes; *tikki 'niara' suarkôr' pok* = he will probably try to come, etc. On the other hand there are short words in this language, as in that of other primitive peoples, which express some picturesque idea, e.g. *ôtok* = the seal which is basking on the ice in the spring sunshine (476).

All in all this language is a very storehouse for the philologist, not least the phonetic and the picture words evolved by the missionaries (750). Since the Eskimo has been in contact with the whites the idiom has changed somewhat (cf. p. 554), so that there are now really two languages: the original with its difficult, guttural sounds is spoken by the Eskimoes among themselves, but with the missionaries and others they use a distinct language and choose with discrimination words easily understood or borrowed words (478). A Labrador-Eskimo dictionary was compiled by a German Moravian missionary in the '60's (525 a, 95 a; cf. 750 and 972).

It is no easy task to teach the children their A.B.C. and it is most difficult for one who does not possess the instincts of the Eskimo. The range of ideas in the minds of the Eskimo is inevitably narrow. As an instance PRICHARD tells of one of the difficulties the Moravian Brethren met with in their translation of the Bible: In Labrador there are no domestic animals save the dog, and when they had to describe the Patriarchs with their herds of horses, cattle and sheep, they were driven to present them under the guise of seals and fish,

interpreting the riches of the earth by the riches of the sea. Many comic points arise during the reading lessons, e.g. when the children have to spell out the words beneath pictures hung up on the wall: the cow gives very good milk! The dear souls would never see a cow, never drink fresh milk (478)!

Teaching Eskimo children of six to read words of twelve syllables or so is not easy for any instructor. To make things easier the missionary PERRETT composed a reading-book in Eskimo. This »*A—B—pat*» with the sub-title: *Okautsit illiniaraksat sorrutsinut* [= Learnable words for children], is a very thin book of twenty pages (478). The success of the schools has however been marvellous: already in 1884 KOCH (528) reported that at the whole coast there were no Eskimoes who could not read and reckon, and in 1905 Governor MCGREGOR stated in his report that even at Hebron all children over seven years could read. We must fully agree with Dr HUTTON's conclusion, that by their quiet labour in remote Labrador the missionaries have worked out the saving of a nation. Now the Eskimoes should be able to control their business themselves.

The missionaries have also taken charge of an Eskimo newspaper: *Aglait Illunainortut* [The paper for Everybody], which deserves the title. It is by no means a daily paper, rather it takes the form of an annual bulletin; it tells of the doings of other lands and helps to stir the Eskimo's loyalty as British subjects. The people like their paper. As far as I know there are today at least twenty books printed in the Labrador Eskimo language.

Though true to all ordinary Eskimo habits and living, men and women bear witness both in word and way that their *'sagiarnek'* [conversion] is a real one. By their simple faith and their willingness to follow the teachings of the Gospel this artless race has risen from superstition and heathen practices to a life of Christian kindliness (478). The Eskimoes obviously delight in the church services and are very regular in their attendance. The organist is mostly a native and the native 'chapel-servant' frequently leads the service and can invariably preach and pray with fluency (cfr 761, p. 154). I can myself confirm that the devotion during the service is impressive, sometimes you will see tears flow down the brown cheeks of the eager listeners.

The Mission's teaching and training has thus completely transformed the earlier savages. Every one who is fond of these humble people and remembers what this kindly race at the mission stations was long years ago (cf. p. 552 sqq.) must sincerely admire the devoted Missionaries when he sees the blessing which has followed their efforts to save the Eskimo's body and soul. Instead

of the mysterious dances and promiscuous orgies of pagan days a balanced harmony prevails in the small societies. The whole race has been lifted to a higher plane of living, Dr HUTTON, that fine observer, says.

It has been said that PERRETT and Hopedale are inseparably associated in the minds of all who follow the work of the Moravian mission in Labrador. So also HETTASCH and Nain are inseparable for all the different visitors to the coast: schooner men, steamship crews, tourists and explorers. The Eskimoes learnt to respect them because they had a learning which the natives had not, and because of what they brought into their lives. This is because the missionaries in all their preaching and teaching have never forgotten that the Eskimo must for some time remain an Eskimo if he is to earn his livelihood as a hunter; t h e i r p o l i c y h a s b e e n t o m a k e t h e E s k i m o a b e t t e r E s k i m o. These, the Rev. PERRETT's words, give us the principles followed by the missionaries which made possible the transformation of the Eskimo who seventy years ago lived almost untouched by the outside world: In the old days when the stations were more shut in, the Eskimoes were more like children. We are trying to make them more independent now, more self-reliant, more manly. We are trying to do what we can, and we feel sure that this is not without blessing (478). The natural isolation of Labrador has also helped them to stand between the people and the vices that civilization might bring if it were grafted on their nature by careless minds. We hope that good shepherds will follow them and carry on their work until a future day when the Eskimoes are able to look after themselves.

The result of the missionaries' educational work among these primitive people, as sensitive as it was sensible, presents the solution of a problem much wider in extent than this special case. The wildness of the Eskimoes was legendary in the 18th century. Journeys along their coast were as dangerous as those in the areas of notorious pirates. The British Government many times were embarrassed in the work of bringing about peaceful relations. KOHL says: Die armen Eskimaux wurden als Teufelsanbeter gefürchtet und verabscheut. Die englischen Matrosen zwangen zuweilen diese Leute ihre Stiefeln auszuziehen um nachzusehen ob sie nicht gespaltene Hornfüsse hätten wie der Böse. It is no wonder that very few foreigners seem to have won the confidence of the Eskimo. What British statemanship could not do was, however, done by a handful of people who were conscious that the childlike mind of the savage is just as easily developed in the service of good as in the service of evil. The missionaries could never use compulsion; it is mainly by means of good example that they have succeeded gently and slowly in transforming

the savages into a free, glad, good-hearted and unusually sociable people whose life is now distinguished by great stability. One who has met the Eskimo and seen their devotion during the Church Services in Hebron and Nain would scarcely dare to believe in their past savagery, if reliable historical sources did not guarantee it. A new ethnological derivative is thus arising in Newfoundland-Labrador, as has already occurred among the Eskimoes in Greenland and perhaps in Alaska.

We have thus happened in Labrador upon a rather rare, clever solution of the very difficult problem facing the administrative authorities all over the world when a primitive people passes over into modern civilisation. The splendid educational work of the Moravian Mission among the Labrador Eskimo can well be compared in plan and execution with the cultural achievements of the Danes among the Eskimoes in Greenland, especially when it is remembered that the work of the former was necessarily chiefly carried out with private, philanthropic means.

There has probably been no one who understood the Eskimoes better than Knud Rasmussen (79) and it may therefore be important in this matter to hear his voice (779):

> We see that along different paths it has been possible to inculcate new habits, new customs, in fact an entirely new culture in the Eskimo race. But what about all the ancient and peculiar, the primitive human traits that have had to perish before the conversion? Is the price not too high for what has been obtained?
>
> It may be; but sentimental considerations and regrets have no place in the realities of life, nor do they prevent the forward march of progress or the differences in the human races from being levelled out, while at the same time the white man's culture is setting its stamp upon the dwellers of all the world.
>
> There is nothing for us to do but submit to circumstances and find consolation in the fact that the splendid romanticism and the enviable lightness of heart in the care-free settlements have given place to a reality which contains this conciliatory factor. That was necessary if the struggle for existence was to be made easier for fellow-beings less advantageously situated. The uncertainty in an Eskimo community, the fear of nature and of the famine periods, and the crudeness of habit born of such anxieties, have been replaced by greater security. Primitive man's narrowminded family egoism, the neglect of orphan children, pitiless indifference towards the aged and worn-out; and assassination, blood vengeance, and merciless persecution, bred by envy, have disappeared in the face of the justice of the law and a humane, public care which surely represents to the very highest degree the elevation of human ideals.
>
> And if we mourn the fact that the ingenious material culture of the Eskimoes will soon be demonstrable only by men of science in ethnographical museums,

that the beautiful, poetic legends are sinking into oblivion when the old story-tellers become mute and are replaced by literature, or if we feel sad because we shall never again experience the inspired ecstasy of a shaman, or the fierce drum-dance, or the unsophisticated, fine, and appealing exclamations of the choruses, we must beware of exhibiting a one-sided under-estimation of what is taking their place; for it would be futile conservatism not to acknowledge that the Eskimo mind in Greenland has already found new expression through native painters, writers, composers, and poets, as children of their time.

In the ruins of the old hunting culture there is vitality enough to feed blossoms that have both beauty and the power to grow.

Knud Rasmussen was inspired principally by the fundamental changes which have been carried out amongst the Eskimoes in Alaska and Greenland by the state administration. But why should not both the outword prosperity and the mental and spiritual advancement of this people be secured in Labrador also by a prescient government. It must be to the advantage of a state to assist producers that can exploit the resources of a country with a minimum of expense to the exchequer.

The Newfoundland-Labrador Eskimo of to-day.

As soon as the ship has dropped anchor the brown-faced and wind-blackened Eskimoes come in their crowded boats and swarm on board. As HUTTON stated: you are at once aware that Labrador is a land of smiles; their brown, contented faces are all smiles, Fig. 227. One finds them a lovable folk from the first moment; a happy people. The white people who live among them also say that the Eskimo are on the whole a light-hearted community, ready with smiles. When they are working together, unloading cargo for instance, men and women laugh and joke the whole time; cf. Figs. 218, 229, 233. With my companions of the 1937 expedition we called them at once 'the smiling people'.

Very soon in this crowd on the boat one finds many fine specimens of the Eskimo race, lively, good-humored, affable, and one feels strangely drawn to the bright-faced folk. One can become fond of them, one soon forgets their rough and patched clothes, their air of poverty, and the smell of harsh fish-oil and blubber odour they spread around them.

Another crowd of Eskimo has gathered on the wharf to see the strangers disembark. When you greet them with the traditional: *aksuse*, be strong! — the Eskimo greeting through the ages — they grunt politely in reply.

When one comes up to the village and meets an Eskimo waddling along with a train of starving dogs after him, one is undoubtedly sorry that no conversation is possible, only an exchange of smiles. But each feels they are

friends, and it is well to confirm it with a handshake. You have surely a lovely impression of this good-natured, easy-going folk, which faces life with a smile; they leave in the mind a memory of kindliness, says Dr HUTTON. It may seem a curious paradox that while the spirits formerly worshipped by the Eskimo seem without exception to have been ill-disposed towards mankind, and his only domestic animal, the husky dog, is an extremely unfriendly and cunning animal, the Eskimo in this district are the sunniest and most friendly people to be met on the earth. The explanation must certainly lie to no little extent in the success which has crowned the educational work among them of the missionaries. Those Eskimo whom the first travellers and missionary pioneers came upon were anything but mild and friendly towards the strangers, as we have seen. A few hundred years ago the ancestors of these same Eskimo were considered an extremely truculent race, cruel and wild.

My personal contact with the people has been mostly occasional; but from my conversations with the missionaries, the doctors and the Eskimo themselves, as well as from my studies of the literature (cf. 126, 400, 402, 424, 472—478, 480 a, 485, 491, 530, 534, 577, 578, 603, 604, 703, 710, 764, 860, 963, 965, 989, 995, 1012 a, 1017, 1071, 1076 a, 1082, 1104, etc. and especially HUTTON's fine and penetrating works) I think I now have a rather true picture of them and I will sum it up in few words.

The happy, delighted grin upon the beaming faces of the Eskimoes bears witness that a certain degree of good humour is their natural state of mind. They mostly look glad and happy. There must naturally be a little reserve with strangers, and it needs a lot of coaxing, Dr HUTTON stated, before their shyness will wear off, then it takes but a little to bring them to a bubbling-over stage. When you ask them about something they respond with alacrity. And when they talk in their own language together, one has the impression that pathos and humour is in their talk. The women mostly chatter loud and shrill with many bursts of laughter. The men too like to chat and joke and to exchange gossip, and the climax is followed by boisterous laughter. With the missionary they speak slowly and seem to weigh their words; they are said to have a rare gift of graphic and fluent speech in their own language, and they are delighted when they have an opportunity to talk things over. — The Indians are quite different.

The white Labrador people I have spoken with about the Eskimo character vie with one another in praising their honesty and reliability. Most of them are said to be capable of much gentleness and affection and are absolutely worthy of the trust placed in them, the residents say. They are said to have a dog-like devotion for a man who has won their confidence; silent and faithful

they sat for hours watching and waiting in the missionary's room, while I sat writing at his table. If you show them a little friendliness you will surely have the support of their goodwill. — In this respect also they are very different from the suspicious Indians. — The manager of one of Hudson's Bay Company's factories, who had lived among them for decades, expressed the opinion that in his district the Eskimoes in character are 'more white than the white-faces in Labrador'. Another curious characteristic was, he stated, that the Eskimoes who were his clients were mostly afraid to run into debt; — the contrary is indeed not unusual among both primitive and cultured people: If one increases one's possessions by availing oneself of credit, one of course becomes richer.

HUTTON during his five years' stay at Okkak heard very little of family feuds or longlived quarrels. The old blood feuds have gone; perhaps the fact that the drink evil has been abolished helps them to be more reasonable. They are quickly roused but as easily appeased, like children, quick to be angry and quick to forgive. An Eskimo may be in a terrible temper, but a few minutes afterwards he is friendly and smiling again, bearing no malice. They are accustomed to take the rough and the smooth together, says one.

The children are charming with brown, rosy-tinted cheeks, glossy black hair and limped brown eyes. Shyly they look at you, — Figs. 220, 217, 221. But childlike curiosity soon comes uppermost and the little one approaches you. All the love of the Eskimo's nature centres on the children. I remember the rapture with which my friend and pilot Julius — Fig. 229 — daily spoke of »my little Sousi», a girl of two; Fig. 219. When afterwards Julius landed happily with a cheque I had just written out for him for 80 dollars in his hand and caught sight of Sousi, a pocket edition of himself, he let slip the cheque, which was caught away by the wind, in order to take the child in his arms. One of the things an Eskimo loves most seems to be to make little children happy. It seems that there are scarcely any naughty children among the Eskimo, in spite of the fact that all observers agree that punishment seems to be unknown among them. Games never seem to lead to quarrels. — Already at the age of ten or twelve years both boys and girls are eagerly trying to help in the household duties.

They are said to be very courageous when hunting or travelling. There is however some kind of inherited fatalism in the Eskimoes. He has often to meet dangers, but the hunter meets them and hardship with his sublime smile, HUTTON states. While the settler toilsomely trails over land the Eskimo travels over freshly frozen sea on ice that bends beneath the sledge; quite safe they say! Their native gift of pathfinding is miraculous, HUTTON says. The trav-

ellers have many times had their hearts in their mouths when the sledge touched the edge of a sheer precipice. In the blinding snowstorm the wonderful path-finder is in his element, it is impossible for him to be faint-hearted. At an early age the boys are allowed to accompany the hunters on their excursions and during these times they obtain a detailed knowledge of the geographical character of their district. It is their pride to find out the best paths. They remember their observations very exactly, and are seldom deceived later when they must serve as guides even in a snowstorm. During the dark period it is the pole-star which guides them on their travels; their paths are co-ordinated round it.

But, though incomparable as a dog team pilot, it is better to be careful and not omit supervision when he pilots on the sea. The coast requires an almost superhuman instinct from its pilots and this seems to be a heaven-sent gift in the Eskimo. He takes his duties very seriously too, no doubt, but sometimes he seems to find it difficult to understand that for instance a steamer cannot float where he has gone in his motorboat. I say it is a wonder of wonders that we were not swamped with *'Strathcona'* in the Nain archipelago under the guidance of my Eskimo pilot.

However happy the Eskimo is, like other children of nature, he does not at all like to be ordered about; he can then be sour, irritable and crotchety, and he is perhaps tempted to run away. If a white man has played a trick on an Eskimo, it is said that the former can never win back the trust of the latter. On the other hand if he is met with goodwill and sympathy he shows the primitive man's inherent devotion and discreetness. These qualities combined with reasonable cleanliness make him an incomparable helper and comrade, at the same time peaceable, happy and gentle. Only jealousy can unbalance the Eskimo, it is said.

In the hard living conditions of Labrador it is surprising that the Eskimo do not worry much about the future, they lay up no considerable store for the days to come; such is their nature. They do not, however, lack forethought and a frugal mind, like the Indians; no, they dry codfish, seal-meat, and deer-flesh for the lean times of autumn and winter. They also gather berries in bags for use in times of want. Yet there is something one admires in their care-free habits; they live from hand to mouth and, come what may, they always seem to be happy, Hutton found.

A very lovable side of the Eskimo's character is the well-known willingness to share the last bit of food with a hungry neighbour. If one starves, all shall starve. All the widows are remembered and cared for. The hunter invites the neighbours to a meal of fresh meat; a fine joint is set aside as a present for the

missionary, he sends to the sick and the crippled a knuckle-bone, and outside the hut the dogs will busily demolish their share. A guest is always welcome to share the dinner of frozen seal-meat or of hard dried fish and baked dough-cake, with cold water to drink, or weak sweet tea. The natural hospitality of the people simply boils over when a friend comes to see them; it will be a delightful picnic party, with food and drink. There is much to talk over: health and hunting, weather, news of friends and relatives. In civilized lands

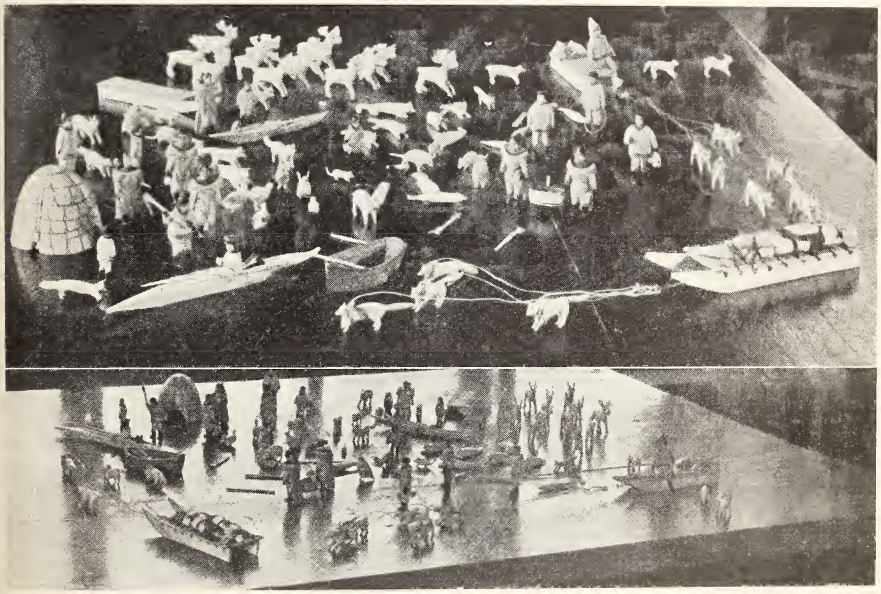


Fig. 251. Mrs K. M. K e d d i e s', Cartwright, collection of old Eskimo sculptures in walrus tusk. Photo the author, 1937.

one will scarcely find a community who so willingly and liberally help one another as the Labrador Eskimo, says HUTTON. This generosity, openhanded to a fault, celebrating a wonderful day and then often living from hand to mouth, is characteristic of the true hunter all over the world.

The good hunter is respected not only for his ability to hunt, but because he soon gathers together such things as are wealth to an Eskimo: a fine team of dogs, a roomy house, a good seal-net. He becomes a prominent man of the village.

Two special characteristics surprised me and in my eyes appeared to be distinctive for these children of nature: Their artistic gifts and gift for mechanics.

The Eskimo is a remarkable artist and in this respect he reminds one somewhat of the paleolithic hunters (cf. 780, 861, 220, 213, 444, 488). The quaint little figures in ivory of walrus tusk of men and sledges and all the animals that an Eskimo knows, were once real masterpieces and bore the true impress of the hunter's instinct; cf. Fig. 251. This is also true of their free sculpture in steatite: the motion in these can in some cases almost be compared with that of the artistic creations of the paleolithic people in the south of France. Their artistic skill has reached virtuosity in relief maps, in which they also give material expression to their geographical observations by cutting out the district in relief in wood or walrus tusk. PRICHARD (761) describes the Eskimo Filipus' map of the hinterland of Nain which proved in the event both useful and correct.

The spontaneous gifts for painting of the Eskimoes can be appreciated on the walls of the International Grenfell Association's tourist shop in St. Anthony.

All the Eskimoes can sing. At the Church service they sing in time and tune and harmony. The band leads the singing and the choir sing beautifully. It has been argued that the Eskimoes have never possessed any music of their own, the old Eskimoes had only the sense of rhythm and the thumping of a drum, one says. Yet the Eskimoes are nowadays one of the most musical of peoples, and this fact can scarcely be explained without the supposition that the Labrador Eskimoes possessed some native music when living in a pagan state, like many other primitive folk, for instance, the Lapplanders. It is not long since the Eskimo obtained musical instruments: violins, cornets and trombones; and nowadays they find expression for their gifts in modern instrumental music. In Nain the Eskimoes have formed a string orchestra, which in 1905, according to MACGREGOR, consisted of 7 violins and a 'cello. They are especially fond of music, said PRICHARD in 1910, and he writes of the excellent brass band which played at the consecration of the church, and added much to the general sense of rejoicing. They all delighted to own a gramophone, and those who could afford such a luxury purchased it. They also sang heartily, and there were many whose beauty of singing was impressive. They still have (1939) a brass band at Nain. A number of the people could play the harmonium, and at the church service one of them plays the organ. But it sometimes happens that, when the last tender chords of a hymn are dying away and the thoughts of the congregation are still hovering in higher realms, the organist suddenly forgets himself and begins a fiery jazz which he happened to hear the evening before in the radio, probably for the first time in his life.

The Eskimo's feeling for natural scenery finds expression in their place-names.

The Eskimoes of Labrador have always been regarded as a very ingenious race, and generally superior to their neighbours, the white people and the Indians. Their mechanical talent is amazing, say all observers. It is, for example, quite common for a white Labrador man, unable to start his motor, to call an Eskimo to help him and, strange as it may seem, it is generally not long before he has the engine running again. It is said that an Eskimo can make up small mechanical miracles from machines that have been thrown away, and from scraps of hoop-iron they soon make skates for themselves.

A peg to hang things on is the Eskimo's will to imitate, HUTTON says, he never saw any one to equal them, and in contrast to many other primitive folk the Eskimo is as a rule very industrious. On the other hand, in general the Eskimo does nothing in a hurry; with great dignity and deliberation he inspects the task he has to fulfil. But after he has once started he works with a will. There are naturally also indolent men, but most of them are active as an ermine. They work to the last and slip away like tired children falling asleep, HUTTON stated.

My observers told me some interesting traits in this respect of the modern Labrador Eskimoes. They considered among other things that the farther north the Eskimo live, the less energetic they are in capturing game; e.g. in Hebron the Eskimo have shown themselves to be quite the most skilful and the most hardy hunters, superior in everything belonging to this branch of their occupation. But at the same time these men are the laziest of the whole coast, I was told. One can guess at different reasons for this. For these primitive people things are the same as elsewhere in the world, that as life becomes easier the farther north he lives on the Labrador coast the less reason he has to exert himself in the northern waters. Even if capture on land is less profitable there, yet seal and other sea mammals are more common there than in the south, and therefore easier to catch. These facts agree with a piece of information which MACGREGOR in 1905 gives in quite another connection: that in Okkak it was reckoned that a man caught 50 seal per year, in Hebron 150, and in Port Burwell 250—300. Placing oneself in the position of this primitive people it does not seem difficult to understand that circumstances are just what one Hudson's Bay Company manager described. It is indeed the inborn inclination of every child of nature which here is expressed in the northern Eskimo: To lie on his back and to sleep or joke, when his stomach has been over-filled — is the supreme enjoyment of life. With little trouble he has a real *dolce far niente*. These facts combined with others seem to show that the impulses

which distinguish the psyche of the hunter continues to live at least in the north among the Eskimoes. Those in the farthest north are also said to exhibit the rather royal indifference of primitive man to the worship of money in European civilisation. The Eskimoes in Hebron speak little or no English; they still wear much of the national dress. At the most southerly stations, where communications are livelier, the traffic greater, and intercourse more varied, it seems that money economy in combination with ready-made clothes has already obtained a firm grip on them.

The tie of the Eskimo blood is said to be generally strong. If he must live and work in a foreign milieu for some time he will easily become homesick, he feels strongly the call of his native land. He then wishes to return to the chosen land of his forefather-hunters and marry a sensible Eskimo girl; then even the countries with crops and flocks and money to be earned cannot hold him back. At the beginning of the present century when some Labrador Eskimoes were taken for exhibition to U. S. A. they were childlike, easily led astray (478). Their experiences did them no good: they were a little shaken in their sense of right and wrong and they had acquired ideas that unfitted them somewhat for the life of an Eskimo, but restored to their own village they confessed that Labrador was, after all, the best land in all the world.

To sum up, we shall here recall the opinions of two men who have known the Labrador Eskimo better and loved them more than most of those who have come into closer contact with them. The Rev. PERRETT, the experienced missionary, one of the grand old men of Labrador, once bore witness as follows: During my service in Labrador I have come into contact with many grand characters among the Eskimoes, upright, honest God-fearing, truth-loving, saintly souls (478). And HUTTON, their medical man, after having lived five years amongst them stated: As I look back over the years many who have now entered into their rest seem to rise up before my eyes: fine, true Eskimo, keen and clever at the hunt. They form a strangely attractive folk, with children's fears and childhood's quaint ideas, and childhood's whims and fancies and unreasoning demands, but with a manly bravery in the face of pain or danger and a manly mastery of the terrible rigours of their daily work that call for admiration. Auch in den Hütten giebt es denkende Wesen, ja Dichter und Philosophen, und ein munteres Menschengeschlecht mit Witz und Frohsinn tummelt sich auf den Schneefeldern; ausdauernde, kühne, energische, wohlwollende und mildherzige Leute gepanzert gegen äussere Anfechtungen, wrote KOHL.

The mind of the Eskimo must in many respects remain inscrutable. Their outlook on life differs strangely from our own; their thoughts and ways of reasoning also. Impatience and fatalism there go hand in hand. But when we see a little deeper into their mind, we shall find the characteristics of the fluctuating mind of a child. Just big children, say the missionaries. But good children they are, easy to teach and guide and keen to develop.

The future of the Eskimoes on the Atlantic Coast.

I have tried to describe these kind folk and their conditions of life as I found them, and the picture given shows clearly that the assertion so often met in travel descriptions that the Eskimoes on Labrador are still in thought and action very near the people of the Stone Age implies a cardinal exaggeration. In life and knowledge they are nc whit behind the so-called settlers in the same coastal districts.

Now, many will certainly ask whether the new cultural stirring we have seen in the Eskimoes has really been for good for the people themselves? I believe we must look at the question from the following points of view.

When we divest the life of the Arctic primitive people of the charm which the unusual, the savage, and the picturesque can at the first moment have for an untrained observer, even the hardiest savage's life will seem a motley web of repeated episodes of which severe want and suffering, starvation, cold, and sickness form the warp. If we consider this I do not think that anyone will answer the above question regarding the Labrador Eskimo otherwise than with an unconditional: Yes. The Eskimo themselves are grateful to the missionaries for having helped them step out of the magic circle which ossified tradition generally lays around the inherited culture of primitive man. Hawkes also confirms that the general attitude taken up by the Moravians towards the Eskimo of a not-too-familiar kindness, and the founding of their authority on it instead of on force is particularly interesting because of the success with which it has been attended. It may be said that the missionaries have saved their bodies as well as their souls.

Regarding the material culture, the Eskimoes of our days still adapt their economic life to the surrounding natural conditions, though now with modern equipment. And the modernisation process continues. The present day Eskimo goes about in rubber boots and sells kamiks, says Lindow. While their neighbours in the West, the Indians, still persist in extreme primitiveness, as will appear in the next chapter, the Eskimoes have entered upon a period of rapid development. Nor does anything indicate that this develop-

ment will stop at its present stage. On the other hand there is no sign that the Eskimo will abandon their inherited way of living upon capture to go over to new kinds of occupation.

The northern half of Newfoundland-Labrador holds little promise for the white settler, and it is to the Eskimo that one is inclined to look for population. The way he lives makes an Eskimo self-supporting there. He can continue to be so as long as the game is sufficient. He can even extend his hunting area in the interior if the Naskaupee Indians disappear (cf. pp. 592 sq., 680, 695 sq.).

— However, as regards the supply of the game in the sea I think it is good to repeat here the urge to consideration which Sir WILFRED GRENFELL expressed some decades ago: See that the game is not exterminated! I myself put the question to the people, to what extent, for example, the reckless mass-murdering of the Greenland seal off Newfoundland can affect the seal-hunting of the Labrador Eskimoes. In Hebron they replied to my astonishment that there was no reason for fear. But this reply is of little significance in my opinion, for the people show by it that they have not at all noticed certain slow changes that are taking place in the animal life of their coast. For a great part of the year, of course, the game of the sea is effectively protected from industrialised capture by the impenetrable barrier which the ice-edge of the ocean lays round Labrador. It would, however, be a mistake to be too sanguine and trust that the game will not run short in the future if the hunting continues as now while the sea is open. The seasonal wanderings of the animal along the coast has caused the annually repeated industrialised killing of seals down to Newfoundland, and will certainly in the long run exercise a growing, harmful influence on the supply of seal also on the northern Labrador coast. When the hunters use modern fire-arms it has been shown that he can unwittingly do much evil. Already it is said that the walrus is very rare in Labrador and practically speaking exterminated in Newfoundland. The number of whales has strikingly decreased it is said; whale-factories have been closed. According to GRENFELL the supply of seals has decreased so much that he is inclined to see in this a cause of the depopulating of certain districts. The supply of salmon has declined very much, it is said. The capture of fur-bearing animals has, in spite of the improvement of equipment and the increased number of hunters, become relatively much less year by year, and in any case has not increased. The great auk and the Labrador duck have been completely exterminated, and other web-footed birds have declined considerably in number. The woodland caribou have become very rare, if they even exist any longer; I could discover only surprisingly few caribou tracks in my flights over the woods (cf. also MACGREGOR, p. 29). If people continue to hunt the great sea animals with steamer, motorboat and aeroplane, as they do now, they also must come to an end. — Cf. 952.

If we assume that a guardianship of hunting with an effective adaptation of the principles of protection developed in Canada will be set up in the future

both in Newfoundland and Newfoundland-Labrador, it can also be said with full assurance that the material conditions for the carrying on of the Eskimoes' inherited economic life will be secured and at the same time their social groups will continue completely safe guardedon the Atlantic coast. The psychological conditions for nomadism also continue in the highest degree; the hunting instinct of the Eskimo can indeed be compared most nearly with that of the predaceans.

The church and the school have thoroughly opened up the Eskimo's world of ideas. When he has learnt to read and write and calculate his power of imitation can be developed without limit; it may be said that he has entered world economy as a commensurable factor. The competitive ability of this people in business and trade has thus been considerably developed. Some Eskimoes have even already understood how to break away from the control of the local trade, and proved themselves skilful in managing for themselves; but there are very few of them. To facilitate this for the others some regulations are needed.

The development cannot be stopped. The Eskimoes have entered upon a stage of fermentation and it is not least the trade which supports and furthers this continued progress. The burning point of the question regarding the continuance and welfare of the Eskimoes' social groups seems to me under these conditions to lie in the financial sphere. If the local trade is not regulated in such a way that it de facto safeguards the Eskimo's economic autonomy he will, like the Labrador Indian, gradually sink deeper and deeper into economic dependence and perpetual indebtedness with all their evil consequences! A reform is necessary and should start from payments *in cash* for the Eskimoes' products, instead of as now, *in trade*, say neutral observers; for in the latter case the Eskimo has quite another idea of the importance of economic values and competition. They will then enjoy all the fruits of their own toil, this will stimulate them and they will be able to build up their own welfare individually and also help their small societies to progress as in other parts of the world. Perhaps they will gradually be denationalized and assimilated into the future stock of Labrador. As yet it is impossible to say when that day will dawn.

This is not the right place to discuss such questions and make out at whose door the responsibility must be laid. Yet it must be stated that the Eskimo in general still lack the ability to demand the necessary changes for themselves, as will be clear from what has been said. If so, it is necessary that the authorities should intervene between the seller and the buyer and regulate matters

If this happens I see no reason why the Eskimo of Labrador should be depressed to a worse position in the world than their kinsmen in Greenland and Alaska. It would even seem easier for the Labrador Eskimo to become relatively wealthy and useful citizens for their ancestral country than it has been for the Danish Greenlanders, who live in a distant and poorer country than Labrador.

In spite of their limited possibilities the Innuit are an intelligent people. With a fine instinct they have remained as nearly as possible on the lines that nature intended for them. They possess, moreover, a physique that must rank high among the species of mankind, for they have fully adapted themselves and their mode of living to the exigencies of a cruel environment, and their physical robustness has enabled them to defy the onslaughts of the cold. They are also a peaceable, law-abiding folk, flagrant breach of order or discipline is very rare; there has been no prison and no police and practically no serious crime, HUTTON states. Is not this a race well worth preserving? PRICHARD exclaims! Cf. however p. 472 sq.

It has been considered (GRENFELL, PADDON) that the Eskimo half-breeds will form the future population of the coastal districts because the Eskimo themselves are dying out, they say: except for those fortunate tribes which have been under the fostering care of the Moravian missionaries, the Eskimo race has disappeared from Labrador, where at one time there were doubtless many thousands (325). Yet there is systematic medical experience (HUTTON, SUK) which does not confirm the lofty thoughts of the half-breeds' influence on the development on Labrador. Following this the half-breeds seem to live beyond the limits of their natural habitat, their physique degenerates and they fall victim to diseases unknown amongst the Eskimo. They can never compete successfully with the Eskimoes, who are so persevering in utilising the local sources of livelihood. Moreover, the Eskimoes at the Moravian settlements are fairly educated, very few being unable to read and write; in this they are far ahead of many of the white settlers, even PRICHARD found (cf. also 891).

At the Moravian settlements the population just about held its own; Fig. 215. Were it not for the diseases which have been criminally introduced there, they would have shown a substantial increase (see above and 17, 116). Let us therefore trust with GOSLING that the legislation needed to protect these real children of the coast will no longer be delayed, and that this deeply interesting race may again flourish on their native shores.

The Indians of Newfoundland-Labrador.

We shall now move away from the roaring surf of the ocean, from the archipelagoes and the fiords, to the soughing woodlands and the deserted rolling plateaus of the tundra in the interior of the peninsula: to the land of the Indians. It must not be supposed that all the statements made in this chapter with reference to the Indians are the result of my personal observation. Much of the information is gleaned from the officers of the trading posts, from trappers, from natives and from the literature (995).

Ethnological connections of the Labrador Indians.

The Indians of Newfoundland-Labrador speak a Cree language, an eastern branch of the widespread language stock to which the Algonkians belong. When Europeans began to take possession of North America it was the Algonkians who mostly occupied its eastern half.

This is why a Labrador Indian still understands the meaning of many of the Indian place-names from the Missisippi to Massachussetts and Manhattan away to the Rocky Mountains, with their expressive and finely drawn distinctions, forming a kind of geographical text-book. The language of the Labrador Indians is also very rich; for example in Father LEMOINE's French-Montagnais dictionary there are 12,000 words (564). It is a difficult language; LEMOINE gives a great number of inflexions for one single regular verb, and there are no less than fifteen conjugations.

From the original Algonkian language two dialects have developed and are to-day spoken in Labrador: M o n t a g n a i s and N a s k a u p e e. For a philologist their differences are not more important than their general similarities; the Indians themselves, however, told me that the differences can be so great that it is difficult sometimes for a Montagnais to understand a Naskaupee's speech.

Judging from their language the original home of these Indians lay in the west. This is also indicated by a story of wanderings preserved among the Labrador Indians (Naskaupee), which states that their forefathers came from the west, from a district to the North of a huge river [St. Lawrence River?], and that east of that home was an extensive area of salt water [Hudson Bay?]. When they arrived in the Labrador peninsula they found that only Eskimo had been there before them. Of course, experience has shown that stories of

wanderings amongst primitive peoples must in general be treated with a certain amount of scepticism. In this case, however, there may be some truth in the story, for the language undoubtedly shows relationship between the Labrador Indians and the western Indian tribes. To some extent the story is also supported by historical information, as we shall see later; circumstances indicate that the former were separated out from the mass of Algonkian peoples at a comparatively late period, and then during the wanderings of the Indian peoples were pushed farther and farther to the east and north-east. Confirmation of the statement that the Eskimoes were on the peninsula before the immigration of the Indians is found in the fact that an older Eskimo tribe, the socalled *Tunnit,* were also living on Labrador before the immigration of the present Eskimoes (see p. 452 sq.); some place-names in Labrador are still reminders of the Tunnits.

What little is known of prehistoric conditions in Labrador does not allow of any far-reaching conclusions regarding the wanderings of the people in those districts. However it can be of interest to present here some information in this respect. But first we will review the

Distribution of the Indian population in Labrador.

In the north-eastern Algonkian culture there is a great cleavage line, the St. Lawrence River: to the north live the Montagnais-Naskaupee and to the south the Wabenaki (871).

The coast of Hudson Bay and its southern and eastern upland were already in prehistoric times occupied by tribes belonging to the eastern Cree Indians, or as they call themselves: M u s k e g o-w u g [= »the fen people»]. After their arrival in Labrador they divided into two large groups (855, 877). The N u t c i m i u i i u [= »the southerly inland people»] settled in the forests south and east of Hudson Bay and James Bay. North of the former, from Fort George to the north the K e e w a t i n-w u g [= »the north people»] took possession of the country. Skinner has drawn the eastern boundary of the latter group over Lake Nichikun; see Fig. 222.

East and north-east of these are two groups of Indians: the N a s k a u p e e now wander in the north and M o n t a g n a i s in the south; the boundaries on Map 222 have been drawn in the main according to data given by Skinner (855) and the information I myself obtained on Newfoundland-Labrador (see farther on); cf. Fig. 253.

When Skinner compared his notes regarding the east Cree mentioned above with Turner's information about the Ungava Cree, that is the Nas-



Fig. 252. Schematic presentation of the hunting grounds of the Labrador Indian bands according to FRANK G. SPECK (873).

kaupee Indians, he found a remarkable likeness in the material culture of these two groups. The east Cree themselves at Hudson Bay said that the Naskaupee are nearly related to them. SKINNER therefore concluded that the Naskaupee are a group of the east Cree who, because of their isolation in the wilderness from the influence of the whites were able to preserve their primitive traits fairly unchanged for a comparatively long time. Further SKINNER's southerly inland east Cree also maintained that a near relationship prevails between them and the Montagnais. Cf. Fig. 222.

From a cultural and dialectic point of view the peninsula according to SPECK falls roughly into three subdivisions:

1. East from a line from Ungava Bay over Lake Nichikun to the St. Lawrence Gulf at Seven Islands; the term Naskaupee (Naskwopi) has been applied here quite generally in the past.

2. West of this line, south of the 'Height of Land' to a point above Lake St. John and from here to a line a little above Quebec and north of St. Lawrence is the traditional Montagnais area, divided by the Indians into the N o t c i m i' w i l n u t s [= people of the interior] and W i n i p e g' w i l n u t s [= people of the Sea].

3. The north-western sector from below Rupert House as far as the uninhabited area north of Lake Minto and east to about longitude 72° W are the M i s t a s s i n i C r e e, at present a quite unknown group (871).

Wissler in his map (1938) of the North American Indian groups, combines the northerly muskego-wug with the Naskaupee and draws the limit between them in the north and the Montagnais in the south from the Atlantic over Lake Melville — Hamilton River — Lake Kaniapiskau and East Main River to Hudson Bay. The boundary of the Montagnais in the south is formed by the Gulf coast and the River St. Lawrence and in the west by the Ottawa River and a line drawn thence to the north as far as James Bay.

According to Wissler then only two large Indian groups need to be considered in Labrador. Apart from details as to the course of the boundary line this last fact would agree with the idea which I found prevalent among the white population of Newfoundland-Labrador.

However simple the conditions of the spread of these two tribes may seem to those who only know Wissler's map they are not by any means so in reality; on the contrary they are quite complicated. To make this clear I only need recall the fact e.g. that it has been possible to confirm from the differences in the dialect that the Naskaupee were intermingled with the Montagnais until quite late times, for example at Musquarro on the Gulf Coast (873); see Fig. 222. Descendants of the semi-settled Naskaupee are also to be found at another place of the Gulf Coast, namely among the Montagnais on Seven Islands.

These circumstances in themselves bear witness to the fact that in this part of the country there must have been quite recently

Displacements of the Indian Tribes.

Not much is yet known of the oldest Indian population in Labrador. Jenness (490) on the basis of archeological facts suggested that eastern Labra-

dor was inhabited in prehistoric times by B e o t h u k s, an Indian tribe who are mostly known to ethnology under the name of Newfoundland's Red Indians (307 a, 455, 490, 583) (cf. p. 450 sq.). It is said that they later withdrew from Labrador, presumably southwards to Newfoundland, where the white population brutally hunted and exterminated them in the 1820's (596). This idea is well supported by the results of excavations on the south-eastern coast of Labrador, during which both LLOYD (583, 584) and WINTEMBERG (1041, 1042, 1044) found ancient dwelling-places with remains from the Beothuks. Later a suggestion was made that the present day Indians of St. Augustine River in Labrador (see p. 609) are related to the Beothuks (873).

CARTIER, during his voyage in 1534 made some interesting observations. He says about the land: it should not be named the Newland, but the land of stones and rocks, frightful and ill-shaped. — — — Except at Blanc Sablon there is nothing but moss and stunted wood; in short, I deam rather than otherwise that it is the land God gave to Cain. There are people in the said land who are well enough in body, but they are wild and savage folks. They have their hair tied upon their heads in the fashion of a fistful of hay trussed up and a nail or some other thing passed through it, and therein they stick some feathers of birds. They clothe themselwes with skins of beasts, both men and women, but the women are closer — and tighter in the said skins and girded about the body. They paint themselves with certain tawny colours. They have boats, in which they go by the sea, which are made of the bark of the birch trees, wherewith they fish a good many seals. Since having seen them I am sure this is not their abode, and that they come from warmer lands in order to take the said seals and other things for their living. (Cf. 819).

— The description is not applicable to the Eskimos; it seems most likely that Cartier met the Montagnais Indians, who always came down to the coast at the summer season.

Other reasons point to the probability that long before the arrival in Labrador of the Europeans and the ancestors of the present Eskimo, hordes of Indians were widely spread in the southern and eastern parts of the peninsula (cf. p. 450 sq.). However, there were scarcely any Indians far away in the north.

Why did the Beothuks abandon Labrador, it may be asked. Many will consider it had some connection with the immigration of the ancestors of the present day Eskimo who, not content with hunting merely in the coastal districts, forced their way far into the interior (cf. 873, 878, VII, XXXIX); even to-day some signs of this can be found, e.g. in the Ungava peninsula north of the Stillwater River (265, 588). It is easier however to seek a reason in

the movements traceable among the Indians themselves in that active new immigrants pushed out those tribes who had been there for a long time (74).

Yet any real information about the displacement of people in Labrador is only available from the last few centuries.

It is historically well known that the Iroquois began quite late to force their way from the south over the upper part of the St. Lawrence basin into Labrador. The Jesuit LE JEUNE saw in 1634 in Quebec the Montagnais torture some Iroquois prisoners to death in the cruellest way; he describes how an Iroquois chief defiantly went to death singing joyfully to the last; from this chief's body a Montagnais afterwards took the heart, cut it into pieces and distributed them to his children; now the enemy was finally conquered! The Iroquois now separated the Montagnais from the western Algonkians; the former were thus already at that time living north of the St. Lawrence River. Pressure from the Iroquois clearly caused the Montagnais to move slowly to the east; and these formed a link in the obstinate struggle with the Eskimo described above (cf. p. 480 sq.).

Both in the north and the south the memory of the Iroquois cruelties during this invasion is remembered by the Labrador Indians; not many decades ago LOW heard that disobedient children were frightened by being told that the Iroquois would come and take them away if they did not behave. A mythical people, called the K ā t c i m ē d g ī z ū, are greatly feared by the Naskaupee, STRONG (909) also reports; they are said to come into the far interior in high-bowed canoes, and they steal Naskaupee children. While their whistling may be heard they are invincible to all but the Naskaupee conjurors, whose familiar spirits drive them away. — This would seem to be a northern version of the tales inspired by Iroquois raids in early times.

An Iroquois dwelling excavated by WINTEMBERG at Khegaska a little east of Natashkwan River shows that the fortune of war had driven them quite a long way eastward out on the coast. In 1660 there was a fight between the two Indian tribes at Lake St. John.

Another circumstance which helped to drive the Montagnais to the east was the invasion by the Micmac Indians in the 17th century to the Mingan district (cf. p. 479). In their birch-bark canoes they had come over the Gulf of St. Lawrence from the Gaspé Peninsula, and in the shelter of the great island Anticosti succeeded in forcing their way to the northern shore, where they defeated both the Montagnais and the Eskimoes.

It is therefore a historical fact that the Iroquois and the Micmacs again set the Labrador Indians in motion in the 17th century, and it seems that the slow displacement of the earlier immigrants, the Montagnais and the Naskaupee towards the east and north-east which we shall shortly study, was due to

the invasion of just these Indian tribes. — Such slow movements of masses of people undoubtedly took place also in prehistoric times.

The struggle of the Labrador Indians with the Eskimo which stood in the way of their progress to the east has already been described; cf. p. 479 sqq. Here we shall only present some fragments to supplement the information regarding the Indians' advance towards the north-east.

N a s k a u p e e. The Jesuit LAURE who was the first to speak of the *Cuneskapi* [Naskaupee] met them in 1731 to the north of Lake Ashuanipi, that is on the Lake Plateau of Newfoundland-Labrador. The Indians' missionary, Father ARNAUD, visited the Naskaupee on Lake Manicuagan in 1853, and he says that their hunting-grounds lay to the north-west of that lake. According to HIND the Naskaupee's hunting-grounds extended in the 1860's from Lake Mistassini away to the Atlantic — a distance of 800 km (cf. 876). HIND also says that at the same date the Naskaupee from the interior used to come in the summer down the rivers Manicuagan, St Marguerite, Trinity and Moisie to the Gulf of St Lawrence to meet their *'robe noire'*, i.e. the priest, at Seven Islands. All this indicates that the Naskaupee in the middle of the 19th century occupied at least the larger part of the Lake Plateau.

Further I think that the place-name Naskaupee River which falls into Grand Lake in the Lake Melville district can be considered as a proof that the Naskaupee also controlled not so long ago the area round the inner part of the Lake Melville drainage system. Some support for this idea can be found in TURNER's placing the southern boundary of the Naskaupee in the 1880's at Hamilton Inlet; at that time their trade was concentrated around the H.B.C. factories Rigolet and North West River. LOW too says that in the 1880's the Naskaupee were hunting west and north-west of Hamilton Inlet; and there can be no question here of a temporary stay in the district, for about 200 Indians had dealings at that time with the factory at the North West River. BELL's map shows that in 1895 the Naskaupee Indians were in the area between the Naskaupee River and the Hopedale district. The Big Hill portage at Grand Falls was described to BRYANT in 1897 as »The Old Naskaupee Trail».

The Naskaupee had also come as far as the Atlantic coast. CARTWRIGHT relates that in 1774 he saw two Naskaupee canoes near a river mouth at Indian Tickle (350 miles south-east of the southern boundary for the Naskaupee in Fig. 253). Further he says that in 1771 he found traces of the Naskaupee near Denbigh Island and in other places on the Atlantic coast north of the Straits of Belle Isle.

Considering all this it can scarcely be doubted that the Naskaupee were formerly living a long way further south than their present limit which we find upon the map just referred to. Yet here a strict difference must be made between the information from the 19th century on the one hand and on the other hand that which we shall give later on from the latter half of the nineteenth century.

The setting up in 1824 of Hudson's Bay Company's factory Fort Chimo at Koksoak River near Ungava Bay was for the Naskaupee a kind of silent invita-

tion to begin to do business at this place. Here it seems that an advantageous trade proceeded for a few decades and the Company had now also got the trapping of the Indians on their hand. But when 1843—1866 the factory was closed and another, Fort Naskaupee or Fort Petitsikapau, opened in 1840 on the north part of the Lake Plateau it seems that the Indians had already become so used to doing business with the whites that they were attracted to the new factory in its turn. Later on the trade became divided also among some other southerly H.B.C. stations, like Fort Mishikamau at the lake of the same name and Fort Winnikapau at Hamilton River, which were opened later. From the trapping lands round these factories the movements of the Naskaupee gradually extended still further south. HIND says that during his visit to the district he found that the Naskaupee had made their way for the first time to the Moisie Factory on the Gulf coast in 1849. The reason for this seems to have been that the caribou in their area had for some years moved along new paths so that a lack of game was felt and a general famine ravaged among the Indians. Crowds of them hurried by different ways down to the Gulf coast in the hope of finding there something to satisfy their hunger. Many of them remained behind after the famine period had passed and formed a special group, the so-called C o a s t I n d i a n s, who earned their living by seal-hunting and fishing, while others died of »the diseases of the whites».

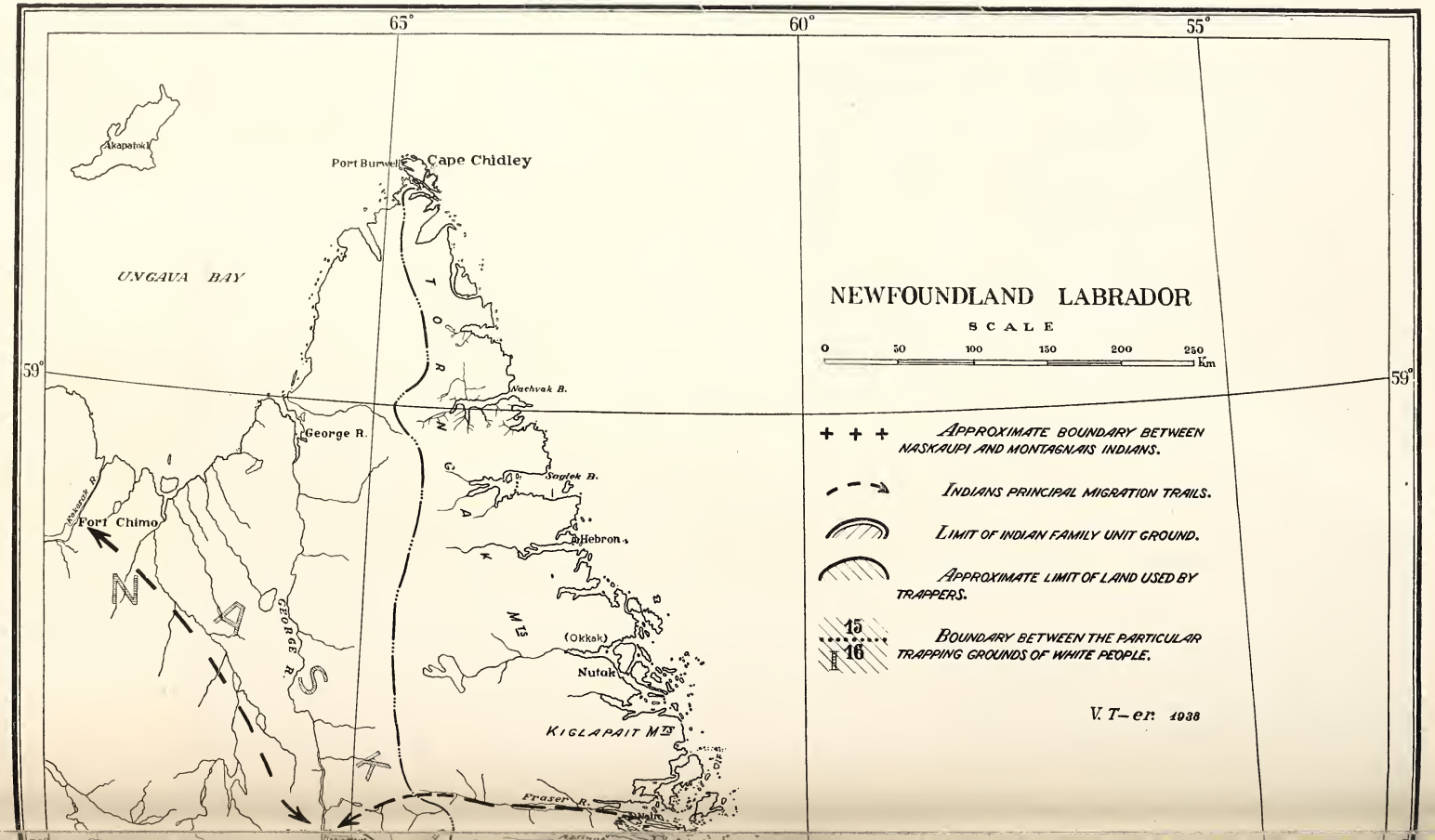
Thus in the middle of the 19th century a tendency can be observed among the Naskaupee prompted by an accidental circumstance to move to the south in the interior of the country, both in families and as individuals.

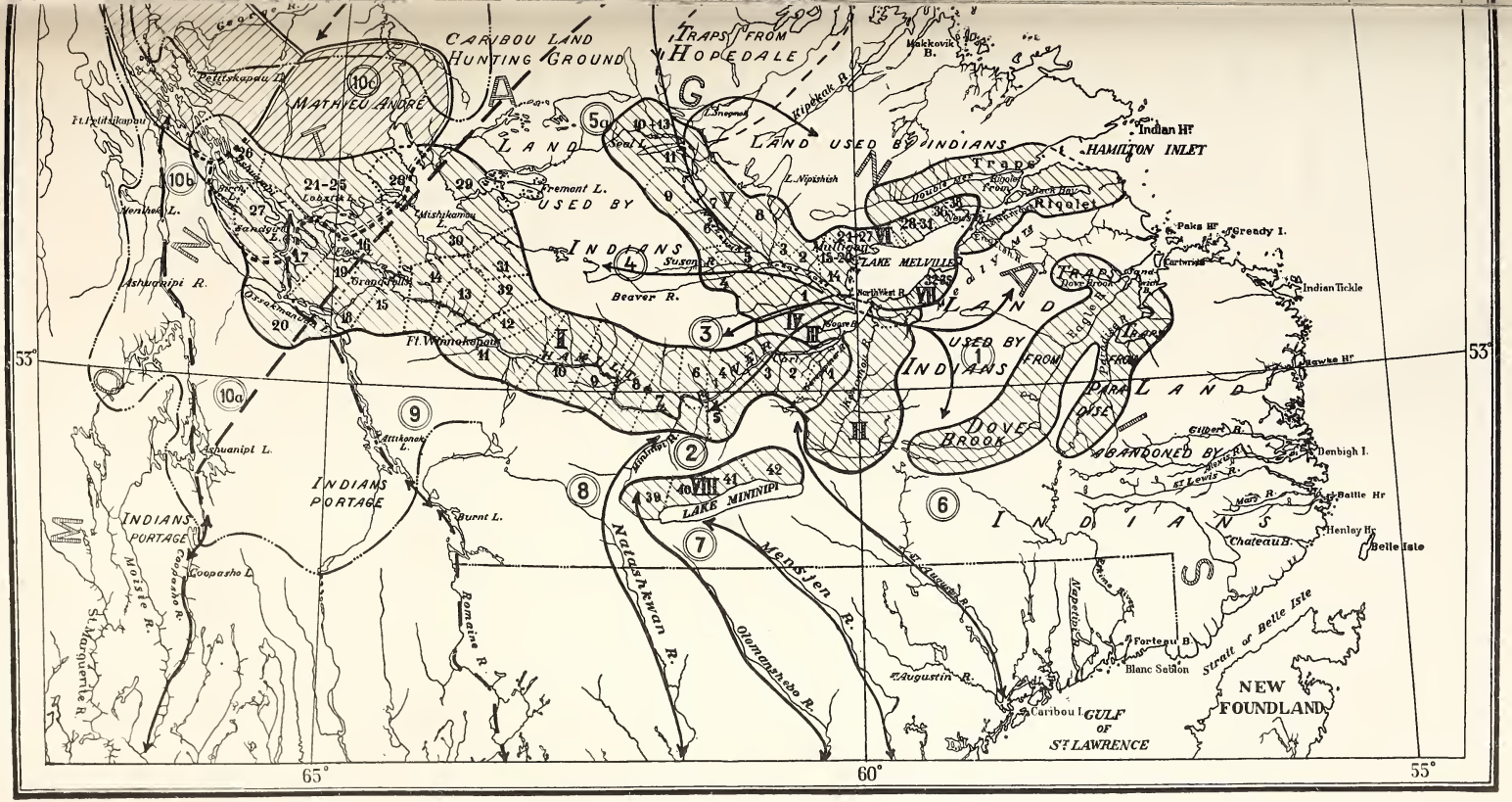
M o n t a g n a i s. In this group on the other hand the displacement has, as far as is known, always gone towards the north-east and north. From the beginning of historical time down to our days Seven Islands has been an important centre of attraction for the Montagnais; there runs the winter road to Hudson Bay over Lake St. John with a canoe connection thence over the Moisie River (cf. p. 610). The Jesuit reports relate that in the middle of the 17th century there were Montagnais at Seven Islands, in 1660 even a large number of them. The missionary DE LA BROSSE opened a school for Indians here in 1669, he composed an alphabet and a catechism for them and also compiled a dictionary of their language. At the beginning of the 18th century the Montagnais had already wormed themselves at Blanc Sablon into the Eskimoes' old district (cf. p. 481 see above). In 1775 CARTWRIGHT related that two Montagnais families were living on the Atlantic coast near Sandwich Bay; two men with a wife and children came from the valley of the White Bear River to what is now Cartwright to visit him. He further stated that 160 Montagnais Indians were living on Nevil Island (?, Nevesek Island in Lake Melville?). Four Montagnais visited him in 1778 and some forty Indians spent the winter in the neighbourhood of Cartwright. The Montagnais were living at Hamilton Inlet until 1779. According to CARTWRIGHT there was then a population of about 500 people between Hamilton Inlet and the Straits of Belle Isle; as these people seemed to have earned their living mostly by seal-hunting, fishing, and catching wild fowl, it may be presumed that they were Eskimoes. During the 19th century the Montagnais gradually spread out over all parts of the extensive Lake Melville drainage system. SPECK expresses

the opinion that the Moisie Montagnais moved to the north only after the time when HIND (1860) travelled up the river. When finally at the end of last century the mountainous district between the coast from Hopedale to Aillik and the George River was swept by great forest fires and deserted by the caribou and the Naskaupee this part remained empty for a long time. Later, when the reindeer lichen had grown up again and the caribou returned at the beginning of the 20th century, the Montagnais began to hunt this old Naskaupee land and gradually took possession of the district (120, 123). In this way the boundary between the Montagnais and the Naskaupee had been further shifted a good bit to the north and the boundary conditions had arisen which now prevail on Labrador, cf. Fig. 253. To this there may have been another contributory cause, namely the gradual invasion by the trappers of the best grounds for capture within the drainage area of Lake Melville; this we shall study later on.

Thus a tendency may be observed in the Montagnais to continually spread over the whole area of the taiga. Parallel with the displacement of the Naskaupee people in contrary directions individuals and families belonging to both tribes have ceaselessly been intermingled. This movement still continues (cf. the Davis Inlet Indians, pp. 608, 654).

Reviewing this sporadic and meagre information from the literature in order of time, the conclusion will be as follows: The Indian tribes have contributed essentially to drive the Labrador Eskimoes from the southern and south-eastern parts of their former area in order to take over their hunting-grounds. The movement of the Montagnais to the north-east and north doubtless started from the pressure exercised by the Micmac Indians in the district of the Mingan Islands (see above), and further to the west by the Mohawk Indians (Iroquois); WISSLER's map should be consulted for the position of these last mentioned (1048). It is possible that the enormous forest fires on the Gulf coast have also furthered the displacement to the east of the Montagnais. As the displacement to the north occurred the Montagnais spread themselves over all those parts of the land which the Naskaupee had evacuated and which are mostly occupied by primeval forest. After the purely chance forward movement to the south in the middle of the 19th century the Naskaupee, who always seem to have kept to the north of the Montagnais, were pushed by the latter farther and farther to the north. Finally (after the H.B.C. factory Fort Chimo had been opened again) they found themselves out in the area round the George River and the Koksoak River on the north-eastern part of the peninsula so rich in tundra. The eternal struggle between the Indians and the Eskimoes was brought to an end at the beginning of 1800's by the united efforts of the Moravian missionaries and the English traders and a kind of peace settled down upon the peninsula. Now the Naskaupee reached even as far as Ungava Bay in the north; in this upland the place-names undoubtedly prove that the


65°
60°
55°
59°
59°
Akapatokl
Port Burwell
Cape Chidley
UNGAVA BAY
TORNGAT
Wachvak B.
George R.
Saglek B.
Port Chimo
Hebron
(Okkak)
Nutak
KIGLAPAIT MTS
Fraser R.
NASKAUPI
NEWFOUNDLAND LABRADOR
SCALE
0 50 100 150 200 250 Km
APPROXIMATE BOUNDARY BETWEEN NASKAUPI AND MONTAGNAIS INDIANS.
INDIANS PRINCIPAL MIGRATION TRAILS.
LIMIT OF INDIAN FAMILY UNIT GROUND.
APPROXIMATE LIMIT OF LAND USED BY TRAPPERS.
15
16
BOUNDARY BETWEEN THE PARTICULAR TRAPPING GROUNDS OF WHITE PEOPLE.
V. Tanner 1938


CARIBOU LAND HUNTING GROUND
TRAPS FROM HOPEDALE
LAND USED BY INDIANS
HAMILTON INLET
MATHIEU ANDRÉ
LAND USED BY INDIANS
LAKE MELVILLE
LAKE MINIPI
TRAPS FROM DOVER BROOK
LAND USED BY INDIANS FROM PARADISE
ABANDONED BY INDIANS
INDIANS PORTAGE
INDIANS PORTAGE
NEW FOUNDLAND
GULF OF ST LAWRENCE
Strait of Belle Isle
Hopedale
Makkovik B.
Indian Hr
Rigolet
Paka Hr
Greedy I.
Indian Tickle
Hawke Hr
Denbigh I.
Battle Hr
Henley Hr
Belle Isle
Chateau B.
Forteau B
Blanc Sablon
Caribou I
Pelletkapau L.
Ft. Pelletkapau
Henrikes L.
Ashuanipi R.
Ashuanipi L.
Coopasho L.
Moisie R.
St. Augustin R.
Romaine R.
Natashkwan R.
Mensien R.
Olomanshebo R.
Kipekuk R.
Susan R.
Beaver R.
Ft. Winnitakapau
Attikonen
Burnt L.
Fremont L.
Mishikamau L.
Sandgirt L.
Grand Falls
Loaring L.
Seal L.
L. Nipishish
Northwest B.
Northwest R.
Moore R.
Kanairiktok R.
Kenamu R.
Paradise R.
Kenamu R.
Kaipokok R.
Gilbert R.
St. Lewis R.
Mary R.
Eagle R.
Traverspine R.
Kapetabeg R.
Kenamu R.
Kanairiktok

district was an earlier inland hunting-ground of the Eskimoes at no very distant time. There the Naskaupee soon assimilated some Eskimo blood and adopted many of the Eskimoes' manners and customs (1002). From the west too a certain pressure seems to have been exercised on the Naskaupee at least at times; thus TURNER says that at the beginning of the 1880's hunters from Whale River district east of Hudson Bay found themselves on Naskaupee land by the Koksoak River and began to hunt with them.

Concomitantly with the movements described above the Indians adjusted their habits and customs to the peculiarities of their new enviroment and developed differences in their mode of living which have become sufficient to classify them into different territorial clans.

Differentiation of the Indians in Labrador. Montagnais and Naskaupee.

It has been said that there are two great territorial Indian groups in Labrador: the Montagnais and the Naskaupee. But in ethnology it has lately become the custom to combine them into a single group: Montagnais-Naskaupee. The essential reason for this seems to have been phenomena in the sphere of non-material culture, for the traditional conception of supernatural phenomena remained the same even after the two clans became separated. It is, of course, extremely surprising that for example agreement between their ideas of higher things show such an unaltered outline in spite of the fact that both groups live under different natural conditions. If it is desired to make the magico-religious ideas still prevailing among the Labrador Indians the basis for this classification there is clearly no reason for the division.

This is the principal reason why SPECK combined them into one group. The Labrador region, SPECK writes, a vast area of about 625,000 square miles, is inhabited by probably less than 4000 Indians (871). The customs and speech of the bands throughout the Labrador Peninsula are in the wider sense essentially uniform, but differentiation is noticeable between the smaller bands located (a) on the southern watershed toward St. Lawrence, (b) on the northern or Ungava and Atlantic watershed and (c) in the portion facing towards Hudson Bay. Some ethnologists have classified the groupings as tribal differentiations, referring to them as Montagnais, Naskaupee and Cree respectively. SPECK got the impression that group-consciousness and dialectic differences between them exist or have existed to a certain degree. But on the other hand no definite culture analogies or racial characteristics (HALLOWELL, BOAS) appear to mark them out distinctly within the geographical districts mentioned above (MICHELSON). Therefore SPECK found it more appropriate

to refer to these geographical groupings of Indians as Montagnais-Naskaupee (871, 877).

On the other hand SPECK (871) pointed out that in the Labrador area one may recognize a certain integration of subgroups referred to as 'b a n d s' (GOLDENWEISER). This means a group inhabiting a fairly definite territory with a more or less stable number of families, mostly possessing paternally inherited privileges of hunting within the boundaries of the territory, often having an elected chief, speaking with idioms and phonetic forms by which they and outsiders distinguish themselves as composing a unit, often with a minor emphasis on this or that social or religious development, often with a somewhat distinctive styles of manufacture and art, and finally, travelling together as a horde and coming out to trade at a definite place on the coast. The bands are located in the drainage areas of the rivers and lakes whose names most of them bear. SPECK has moreover determined the most of the Labrador bands, Fig. 252. But he points out that the remote north-western bands' areas on this map should be regarded as tentative only, because the information is derived from indirect native sources and not through contact.

To obtain the premises for an objective systematization the American ethnologists considered it desirable to direct their study of the Indians first to research work concerning these small sub-social units, 'bands', and then, having a thorough knowledge of the characteristics of each of these, it would be possible to re-group the bands into units of a higher order. Such an attempt by SPECK has been given in Fig. 252. There is no doubt that this scientist has entered upon an appropriate and practical path; I can say this with a certain knowledge of the subject, for I myself used just the same method successfully a decade and a half ago in working out the systematic divisions of the North-Fennoscandian Lapps (Fennia, Vol. 49). As regards the Lapps, it proved to be quite inacceptable to mix together habits, customs and ideas belonging to widely separated districts in the north and in the south, as the philologist-ethnologists of the north had usually done, for such a synthesis rested upon premises which from a geographical point of view are not commensurable. A consistent examination of the scattered Indian bands in the wilderness of Labrador will, of course, come up against many difficulties, and will demand a very long time for its completion. For, as SPECK himself has said, uncertainty will render vague the demarcation lines etc. of the different bands until each group has been examined without reliance upon an intermediary.

No real, thorough ethnological distinction can be clearly shown to exist between the two territorial clans, the Naskaupee and the Montagnais. The small

differences which can be traced in their sociology and their material culture will probably be taken by many ethnologists to be only nuances of the basic characteristics. In spite of this I think that for most important practical reasons the two groups must be kept apart in the following presentation. A few fragments of information will explain more in detail the differences between the groups. If, for example, we take an anthropogeographical view of the questions which interest us here I think we can find an acceptable systematization.

The woods and the tundra offer quite different conditions for the hunter and make quite special demands upon his activity. Caribou are to be found in both regions, but their position as to game is different within them. In the tundra the importance of the caribou surpasses that of all other animals; it is the wild reindeer which almost alone supports the economic existence of the Indians there. On the other hand, in the forest areas the caribou has in these days considerable importance only in such districts where there are large connected treeless areas; in the forested parts the lack of caribou is compensated by different kinds of small game: the beaver, the porcupine, the hare, and birds. There are also the finest fur-bearing animals (see farther on), and the deeper and thicker the forests, the thicker, darker and more valuable are the skins; the skin of the marten, for example, comes to resemble sable. In Labrador the tundra is more connected towards the north, the forest region towards the south, and this circumstance naturally has an influence upon the kind of hunting; this in its turn is decisive for the economic and social configuration of the hunting societies.

As the poverty of nature increases the importance of caribou hunting rises (206 a). This is especially true of the tundra; the hunting must be extensive because of the biological habits of this chief game, and under these circumstances the hunting areas of the tribes form one single great whole. The economic system again develops on more or less distinctly communistic principles and yet the social structure remains loose and undeveloped.

In the primeval forests with mixed game and valuable fur-bearing animals the method of hunting becomes more intensive. For this purpose the hunting ground is generally divided into smaller areas within which hunting and trapping are carried on by a smaller group alone, a tent group or a great-family. The economic system in this way is stamped by the individual right of each family to own the booty. The social structure is already on a higher plane of development, and the society bears the stamp of the great-family. Within the c o r e s of these two areas which form Newfoundland-Labrador, the tundra in

the north and the taiga in the south, nature is compelling the development of a different structure in the economic and social habits of the Indian tribes.

As the Indian peoples were slowly displaced from their good old hunting-grounds out towards the still more inhospitable extreme end of the continent in the north-east, they met ever worse natural conditions and existence possibilites. Cold and barrenness increased the farther they moved to the north-east, and they were compelled continually to adapt their material culture to this worsening; a rather difficult task at their primitive stage. Above it has been indicated that the Indian hunters are distinguished by their great mobility resulting in an ability to adapt themselves to any new natural conditions. From this again it follows that if there is peace and calm in an Indian society the local differences tend to develop permanent and more or less homogeneous groups of hunters, in this case the Naskaupee and the Montagnais, as well as local transition types between them. Trade with the whites (Hudson's Bay Company) showed itself during the 19th century apt to further a stabilization of the types. In nort-easternmost Labrador the change to new surroundings led to a degeneration of the Indians' material culture.

On the other hand, as regards the magico-religious ideas, the continuity remained fairly unchanged in the north and the south (cf. 878). The starting-point of my conception of the kind of differentiation lies just in this contrast.

The circumstance here quoted is confirmed to a certain extent by reality in Labrador (cf. 965). For example it appears that the hunter and the hunter's family who had grown up among the Naskaupee but moved over to the Montagnais or vice versa, in order to earn their living, had to give up the customs of their youth and adapt themselves to those which nature enforced upon the people in their new surroundings. In the boundary districts between the two great core areas different degrees of mixed types of course arise. Father Cooper told me about Indians west of James' Bay who, while hunting in the forest follow the principles of their family areas, on the tundra again the principles of hunting communism prevail. From a geographical point of view this is a boundary case due to the biogeographical conditions. Another such boundary case is to be found in the districts south of the east-west watershed in Labrador, where the hunting varies according to the season and the supply of game, these again varying with the geographical conditions. These exceptions, however, do not invalidate the main rule. This conception, which I found applicable to the Lappish half-nomadic hunters, seems of course not to have been unknown to Speck (873) who writes: Two types should

henceforth be recognized as prevailing in the Labradorian culture-area, the variation being traceable, I believe, to famine conditions and the natural history of the game animals.

It seems to me that the same more or less subconscious conception of, let us say, two different derivates of the hunting life is vaguely present in the minds of the white population of Labrador when they speak of the Naskaupee and the Montagnais. It should be specially mentioned that the managers of the H.B.C. stations, who may be reckoned as best acquainted with the Labrador Indians whose language they speak, continue to differentiate between the Montagnais and the Naskaupee. Also among them it seems to be just on the nature of the hunting-grounds and its consequences that the differentiation of the two great groups of to-day is based. The Indians themselves, of course, have no critical eye for ethnological distinctions, yet their intuitive apprehension seemed to me something to be reckoned with. They make for example a difference between the coastal people, i.e. those who in summer visit the coast of the Gulf of St. Lawrence, and the forest or inland people; both have some distinctive customs, but this is not all. Subconsciously the southern Indians make a certain ethnic distinction in for example the name N a s k a u p e e (cf. p. 657) by which the most northerly Indians do not like to be known; they call themselves N e n e n o t. During a conversation with the former and the present chiefs of the Montagnais' Mishikamau band, they told me that they call themselves Forest Indians, I n a' p a' o u' w i l n u t s, while they call the Naskaupee Tundra Indians, M o u s' a' u a u'- s h i' b o w i l n u t s, and they seemd to consider the difference between the groups as categorical. As regards languages they said that certain difficulties arise in trying to understand the Naskaupee. The Naskaupee earn their living by hunting the caribou and some foxes, they said, on the other hand the Montagnais restrict themselves often to small game and valuable fur-bearing animals. They also said that the Montagnais were not so dependent on meat as the Naskaupee, but could manage quite well with »white man's food», while the Naskaupee consider that only flesh is nourishing food.

The differences in the northern and southern Indian groups' habits as described above, which are based upon the differing natural conditions in their respective areas, seem thus to me to justify the separation of the two territorial groups of Indians in Newfoundland-Labrador: the M o n t a g n a i s and the N a s k a u p e e.

Yet here it must not be forgotten that the two groups are not a permanent division. Because of the internal changes in both groups the differences are

in our day in process of disappearing. The customs of the Naskaupee will clearly in the future agree more or less completely with those of the Montagnais (cf. p. 696).

Present distribution of the two Indian groups.

The approximate boundary between the two groups has been drawn in Fig. 253 from the information I received from the H.B.C. managers and the trappers. In our day this may be regarded as running along the Notaquannon River and from its sources westward to Resolution Lake, a river lake in the George River, and thence further to the west. The divide between the Naskaupee and the Montagnais is at the same time a divide between Lake Mishikamau and the George River, said WALLACE in 1905 (995). The drawing of the boundary was, however, quite a risky undertaking, for neither the information with regard to the extent of the Indians' hunting-ground in former or later times, nor the outlines of the map used as a basis proved to quite definite.

This boundary, or perhaps more correctly boundary zone, is, moreover, not an insurmountable wall; the Montagnais, for instance, are continually crossing it in our days, as will be shown later on.

From Fig. 210 will be seen how sparsely the Indian population is to-day distributed in these two districts.

Censuses.

According to KROEBER (539) the subarctic Algonkian Indians (Montagnais, Cree, and Naskaupi) number about 2,300. Yet those living within the frontiers of Newfoundland-Labrador may be reckoned as numbering only between 250 and 300; in 1935 they were 273 (222). Probably no reliable census exists for them; it would also be difficult to compile a register of a wandering people whose individuals are one summer on the Gulf of St. Lawrence, another on the Atlantic coast. The difficulties are also increased by the custom of the Indians to change names not only once but several times so that the malicious spirits shall not catch them when they fall ill; — HIND says: If a child is ill the parents will not infrequently change its name, under the impression that its life will thereby be saved. It is thus not easy, sometimes impossible, to identify persons who may make their appearance at different places bearing different names.

Now, it should not be forgotten that a considerable number of the so-called Canadian Indians (p. 609) pass nine months of the year in the southern part

of the Montagnais area. The exact number of those is not known to me. However, to arrive at the number of Indians in Newfoundland-Labrador those persons must be added who spend the summer on the Gulf coast but in winter practise their trapping in our area; cf. p. 609 sq.

Hind (434) gave (following the Blue Book, 1857) the following statistics concerning the Indians visiting the Hudson's Bay Company posts in eastern Labrador:

on the north shore of the Gulf	
Seven Islands	300 persons
Mingan	500 »
Musquarro	100 »
Natashkquan	100 »
in the interior of the peninsula and on the Atlantic coast	
North West River	100 persons
Fort Naskaupi (Nascopie)	200 »
Rigolet	100 »
Kipekak (Kibokok)	100 »
	Total 1500 persons

Bell (56) gives the following numbers of Indians dealing at the different H.B.C. stations in 1895:

at Hamilton Inlet, Montagnais	125
» Davis Inlet, Naskaupee	230
» Fort Chimo »	90

According to Turner (965) the number of Naskaupee Indians in the 1880's was about 350. Shortly after 1900 Cabot (123) reported that they consisted of some 40 to 50 families which, reckoning 4 persons to a family, means 200 individuals. In 1937 I was told that the Naskaupee in the so-called Davis Inlet group comprised some 20 families and those of Fort Chimo scarcely more. The Rev. Paul Hettasch after his contact with them for several decades considered it certain in 1939 that they had decreased and at that date numbered only about 200. Budgel, Jun., the H. B. C. manager at Voicey's Bay, estimated the number who visited him in 1939 at about 100. It is clear that the Naskaupee are decreasing.

Information from the government given by Townsend (950) shows that the Gulf Indians in 1908 numbered 694 and were divided as follows:

Natashquan	76
Seven Islands	377
Mingan	241

In 1912 some 25 Indian families came south to St. Augustine, according to Bryant (108).

The census of 1935 (222) gives the number of Indians on the Atlantic coast as:

North West River	154	of	whom	56	married,	8	widowers	and	90	unmarried.
Davis Inlet	81	»	»	38	»	2	»	»	41	»
Voicey's Bay	38	»	»	16	»	2	»	»	20	»

Unfortunately, because of the present war, I have no possible access to records and other information concerning earlier population figures (cf. however the sources listed in the bibliography).

Judging from the scanty and heterogeneous statistics given above and the information I obtained in Labrador there is some degree of certainty in the statement that the Naskaupee have greatly decreased — comparatively speaking — in the last half century, while the Montagnais seem to have increased a little. They, too, were formerly at the mercy of every whim of Nature in the wilderness, but since they have become so to say the servants of the white traders their living conditions have become more even and starvation has ceased to plague them (of this more later) (cf. 539 a, 539 b). The figures in themselves give merely a superficial idea of the scanty population of the two territorial clans. The statement that to each individual Indian 400 km^2 of hunting ground or more can be reckoned is more revealing — the best parts of the area are of course exploited by the white trappers. — For the sake of comparison it may be stated that in the interior of Norwegian Finnmark in the 1550's about 115 km.^{2} per inhabitant was the figure (according to Smith quoted by Solem, 1933).

The population figures illustrate a general condition: the stage of cultural development usually bears some relation to the density of population. In Labrador the families are fewer in number the further we proceed toward the northern interior: the game is fewer and more uncertain in supply; there the social and hunting systems can never be organized in detail or the land better exploited. The Naskaupee can be considered pioneers on the extending frontier of migration.

The Indians of Labrador are certainly not so little mixed with foreign racial elements; Hind speaks of Montagnais half-breeds. The dilution of the Indian blood probably began already with the trade in furs when the so-called *coureurs-des-bois* roved about among the Indians, but I do not know of any detailed information in this connection (cf. p. 662). Most of the Indians who

spend the summer on the St. Lawrence coast west of St. Augustine represent a type which must have more or less white blood in their veins through consorting with the traders and settlers. With but two or three exceptions the Indians of St. Augustine and the Atlantic coast are considered unmixed Indians (995). Yet paradoxically enough some members of the Davis Inlet band owe their inception to the mating four generations ago of a Scotsman (or Scots-Cree half-breed) with an Ungava Eskimo woman (897, 906). This family, called Rich, is completely Indianized; cf. Fig. 286. Some Eskimo blood has been mixed in the northernmost Labrador Indians.

Health.

I have not found any scientific information in the literature regarding the health and pathology of the Labrador Indians. But the late Dr Harry Paddon told me of some results of his observations of the North West River group of the Montagnais. The Labrador Indians look healthy if mostly thin, powerfully built and sinewy. They are not protected by a armour of fat like the Eskimo, but they impress one as being a strong type; see Figs. 254—258, 214, 285—287, 299, even if they cannot be compared with the Eskimoes in this respect; the Indian can never carry such heavy burdens on his back, nor can he compete with the Eskimo in endurance as a boatman. Yet the Indian also is unbelievably hardened against wind and weather, and his imperviousness to cold is phenomenal. He lies down to sleep out-of-doors in winter in caribou-skin only, and examines his fishing-nets in a howling snowstorm, dipping his hands in the water now and then in order that they shall not freeze. His children run about in the snow barefoot. His whole body seems to be as hardened as his face. Part of his hardiness may be due to the practice of fasting which was formerly common among the Montagnais and sometimes lasted eight days; the main purpose was probably magical (435). The women, too, are strong; a few days after childbirth the mother is up and about, the baby is stuffed into a fur bag with moss as a napkin and on goes the caravan.

Many Indians live long, sometimes to the age of 70 and more if they do not die earlier from an accident, or of famine or disease (1050). Yet as a rule their lives are much shortened by lung diseases and stomach disorders; for these they have only the shaman's drum to help; seldom have they had any touch with a doctor. The Indian population in the north at least has been greatly decreased by the ravages of disease, for their resistance power to the white man's illnesses is also small (cf. Table on p. 592 sq.). It is said, however, that the Indians who live isolated in the interior suffer less from disease than the

Eskimo on the coast. One form of influenza appears fairly regularly in spring and autumn; spitting and uncleanliness foster the spread of germs. Venereal diseases are said to be absent from the Indians. On the other hand consumption ravages the youth and tubercular hip disease is common among the Naskaupee children. Carbuncles also occur. Infantile mortality is terribly high and diarrhœa further decreases the number of older children. It would be a profitable task to investigate systematically the health of the Indians in the same way as has been done among the Eskimo (475, 910).



Fig. 254. The former chief, Atvon Pest (to the right) and the present chief, Panace Pest (to the left) of the Montagnais' Mishikamau band. In the background is the village North West River; to the right Hudson's Bay Company's store and to the left trapper houses. Photo the author, July 21st 1937.

Remarks.

The mode of life and the customs of the Indians undoubtedly present many interesting aspects for the ethnologist. Before describing life among the two territorial groups in Newfoundland-Labrador it may be well to state that while not a little is known of habits and customs among the Labrador Eskimo, only some scattered ethnological fragments are available regarding the Newfoundland-Labrador Indians, especially the life of the northern Montagnais in the taiga. They like to stay in their primeval forests and only make flying visits to the Hudson's Bay Company's factories, in winter to exchange furs for food and other necessities and in summer to trade, to meet their priest and receive

Holy Communion; cf. Fig. 259. If those who wish to meet these Indians do not take these opportunities, they can only hope for a lucky chance to catch a glimpse of them, for they soon retire to their taiga again. In Rigolet I was told that the sociable Eskimo say jokingly: The ape can talk just as well as man; but he is much more cunning than man and therefore he is silent; for if he began to talk it might easily happen that man would find a way of making him work. That is why the Indian is silent and hides away in the recesses of the woods!

The Indians show no inclination for contact with white strangers. Their shyness at a chance meeting is probably chiefly due to the fact that only a very few of those in Newfoundland-Labrador can make themselves understood in English — or perhaps they like to give the impression that they do not understand that language. Nor has it been necessary for them to learn it, for the intelligent local representatives of the Hudson's Bay Company — who are now really the Indians' 'big chiefs' — usually speak their language fluently. On the other hand, I met one man among the Montagnais who spoke French fairly fluently and with an excellent accent. It is clear, therefore, that it was in general difficult for me on my Labrador journeys to obtain direct information about these people, and I gratefully testify to the readiness of H.B.C.'s managers and some trappers to help me, partly by interpreting and partly by telling me what they themselves knew of their Indian neighbours. I also sincerely hope that what is here written will contribute to some extent to a spread of the knowledge of the Indians' life in Newfoundland-Labrador

The Montagnais Indians.

The name, of course, was given them by the French missionaries (943). The English-speaking population often use the name 'Mountaineers'. The Indians themselves use the name Tshe'tsi'uetin'euerno (59, 434).

Speck has, in his comprehensive works (877, 871), given a fine account of the non-material culture of the Montagnais-Naskaupee. But no special detailed information of the habits and customs of the Montagnais in Newfoundland-Labrador exists (cf. 129, 168, 818, 819, 875, 916, 1067, 1068). Remarks and notes appear here and there in travel accounts and in some special ethnological works (see bibliography). I shall, with the help of my own observations and the information I obtained on the spot, describe them to the best of my ability.

Some general impressions.

The physical type and the dress at once indicate the difference between the Indians and the Eskimoes, who always (except those of Rigolet) go clad in their white sillapack.

My first meeting with Montagnais left no impression of having been face to face with the lordly sons of the wilderness; it was not »the last of the Mohicans»



Fig. 255. Atvon, the former chief of the North West River Montagnais (second from left in the middle row) and one of his sons (to the left of Atvon) who is considered amongst the Indians an expert in scapulamancy. Photo the author, July 7th 1939.

whom I met. Externally the 'Redskins' of Labrador are curiously prosaic. They are not red but fairly dark-skinned. They were called Redskins because once upon a time, like other Indians, they painted their faces in war time with a red colour obtained from roots, bark and ochre in order to terrify their enemies and also to please the spirits who control life and victory. LE JEUNE in 1632 mentioned that the Montagnais had painted their faces with red, black, and blue stripes when he first saw them. Their clothing was of skins, they wore no covering on the head and their long, greasy hair hung low over their shoulders. They were armed with bows and arrows, a shield, and a lance.

These same people also presumably wore in olden times beautiful white chamois leather clothes richly ornamented with paint — cf. Figs 288, 289, forehead bands and feather decorations; but they are now out of fashion



Fig. 256. Montagnais Indians arriving at North West River to see their priest. Photo the author, July 20th 1937.

(cf. p. 640 sq.). Now they go about dressed in unimaginatively ugly, ready-made clothes which almost give them a proletarized appearance, and the stamp of poverty marks their destiny. The only thing reminiscent of a national dress is the woman's pointed cap, made of wedge-shaped pieces of blue, black and red, see Figs. 256, 257, which HIND as early as 1861 found to resemble

somewhat in shape the Frygian cap. The cap in conjunction with the corkscrew curls bound round a piece of wood on both temples suits the dark-skinned face. Some of the Seven Islands men also wear bead embroidered caps, Fig. 268. But this headwear and the moccasins were the only ethnographical distinctiveness in the appearance of the modern Montagnais. On the other hand it must be said that some of the girls had got hold of some second-hand headgear, and a few young wives made a display in dresses of threadbare, dark-blue shantung.

Another difference is that the Indian is taller and slimmer than the Eskimo in general. The faces of many — both men and women — are attractive; the eyes are usually wide open and have a soft look. The skull is broader, the face not so long and the nose more prominent (see table, p. 445); Figs. 255, 256, 257. The hair is black, thick and straggling, and the men generally brush it back over one ear while the women roll it up into two big corkscrews, one on each side of the face; Fig. 257. The beard growth is very weak. Hind was much struck by the general aspect of the Montagnais women: their eyes are inclined, their noses aquiline and their jaws square, the last feature being also the distinguishing character of the men. Both men and women generally have thick lips. The wild expression one expects in an Indian: an eagle glance from under coal-black hair framing a broad face with tightly closed lips, is only exceptionally seen among the Montagnais. The figures of the younger women are nearly always slim and lithe and they are especially winning in looks, with fairly regular features, and hands so well formed that few of their sisters in society circles in large towns can compete with them in this respect.

The Montagnais impress the observer as being healthy, families are large, the children fit and jolly; see Fig. 258. Yet infant mortality is said to be high and tuberculosis frequent among the children and young people. One other thing I must add: never did I see the brand of 'fire water' on the face of a Montagnais.

They are a very peaceful people. As one learns to know them better one soon finds something attractive in their calmness. I myself can fully confirm the opinion of one of my white trapper friends: that they really radiate friendliness and goodwill when they see a person for the second time. The individual is very closely bound to the community. It is not any public authority which keeps the hunter band together, nor the chieftaincy, says Lips (580), but tradition, custom, and public opinion in the band itself.

I much regretted not being able to talk to them in their own language, and most of my information was therefore obtained through an interpreter. Yet the local population also told me much of the mental characteristics distinguishing the Montagnais from the Eskimo and that merits repetition here because it throws some light upon the Indians' psychological state to-day. The mentality of the Indian, they said, is stamped with the nature of the wilderness which so rapidly changes from wild fury to dreamy peace (cf. 303). That is why, say the trappers, it is so difficult to understand the primitive Indian's



Fig. 257. Montagnais visiting North West River in July 1937. Photo the author.

train of thought. He is mostly a child of impulse, and that is why he generally lacks the orderliness, strength of will, and endurance of spirit which is found in the Eskimo. Already his ideas and way of expressing himself have a child-like touch; many a time it was a great trouble for my interpreter to paraphrase my question to fit it for the simple understanding of my Indian informer. Their world of ideas is clearly restricted, mostly to hunting and the life in the wilderness; they seem to be quite indifferent to the mentality and impulses of the white man, however loudly they laugh and nod at the speaker. They can scarcely apprehend an abstraction, and it must be very difficult for a priest to get them to understand the mysteries of the Christian doctrine; the only thing they seem to have really grasped is the notion of »the Great

Spirit» which still can scarcely fit into their original animism (cf. 177). The psyche of the Labrador Indian is clearly very differently attuned, it may be said, from that of the lively and speculative Eskimo.

The Labrador Indian impresses the 'pale-face' in that he is so care-free with regard to the morrow. People say he is like the wild animals of the woods; he is in good condition in the autumn but thins off towards the spring, and the reason is his improvidence in the matter of food. The Indians collect little or nothing, when hunting is at its height, for provision against the hard times



Fig. 258. Thoroughly healthy Montagnais' children in the camp of the Mishikamau band at Grand Lake. Photo the author, Aug. 14th 1937.

which mostly repeat themselves every spring. A speculative observer thought that the people were indolent when they noticed that the old basis of their economic life was gradually disappearing and did not make any effort to substitute a new one; but this scarcely touches the reality. The Indian's attitude to his needs was the same at the no very distant time when the forest still swarmed with caribou and perhaps moose so that the hunter took his food just when he needed it, so to say direct from Nature's own storehouse. In these days, when the number of hunters has probably increased while the supply of game has somewhat diminished or remained the same, the Indian persists in the same care-free attitude from custom it may be said, for if

there is a main thread running through the life of the savage it is the power of custom. The trouble of collecting and carrying about food in the wilderness seems to loom large for the Indian and dull the urge of sensible prudence. Nothing worries him as he enjoys the charms of summer.

Thus no preparations help to make life easier and pleasanter during the hard winter and early spring. The Indian only laughs at the silly pale-face — a ridiculous figure who gives himself so much trouble, for example, to live in a large house which needs so much timber-felling to be kept warm. Why should one buy and carry about heavy stores? MERRICK (p. 95) on the 11. November met a great Indian family in the Hamilton River valley; their whole store of food was not so large as that for two white trappers for hunting till January, he says. In this way time and again the Indians have the bitter experience of finding their food come to an end half-way to their hunting-grounds after their stay on the coast. *'Sham sheevan'* [= very hungry] is therefore their chronic state in winter (cf. p. 624). When the Indians are hungry they must take what they can; the whites call it: stealing; they examine the trapper's 'tilt' [blockhouse] and eat up the flour, while their dogs sniff up the larder under the snow, say the trappers. Need knows no law, say the Indians in response: we are starving. But the Indians are always hungry, say the trappers; year after year it is the same thing (104). It must, however, be observed that to the Indian this is no criminal action; if he takes without permission something from a white trapper's store he has not used violence against him; he has only taken something of what nature designed for the maintenance of all. He is in his attitude to life a naive communist. WALLACE in 1905 wrote: No Labrador Indian north of the Grand River will ever disturb a cache unless driven to it by direct necessity, and even then he will leave something in payment for what he takes. — Yet improvement may be noticed to-day in regard to provident action: some Montagnais have begun to realise the value of carrying with them on their tabansks [toboggans] small bags containing dried meat and pemmikan. —

Ease, not to say laziness, seems to dominate the greater part of his life. It is said that the smell of food can smother his objection to regular work. But if he gets his wage in advance he will slip away when the longing to hunt urges him. It is useless to try to force him in any way, for if he does not want to do a thing he will not, and if he is offended resentment can simmer in him for a long time. He ought, for example, to be most useful to explorers and cartographers with his skill as a guide. Yet WALLACE in 1905 stated: It is impossible to engage Groswater Bay Indians to guide you; their strength holds out well enough but regular work bores them and then they begin to do all

they can to annoy the pale-face, and are said even to mislead him intentionally. This is why many have found them more trouble than use on expeditions. But of course there are exceptions. In the same district I heard much of a legendary Montagnais called Loue who in his time was of great service to the Hudson's Bay Company, as MERRICK (p. 60) relates. Yet, for all the disadvantages, it is good to have an Indian in one's company, for no one can 'read the country' so well and if other Indians or Eskimoes are met on the journey he is a good introducer. Another thing that is useful is his capacity for drawing maps (872, 995). HIND tells of maps constructed by Montagnais at the request of Father Arnaud in 1859 and showing the route from the Hamilton River via Petitsikapau Lake and the Ashuanipi River to near the sources of the Moisie's eastern branch and running down to the Gulf. This map well illustrates the Indian's remarkable ability to delineate the general features of the country through which he has passed; HIND says it was singularly exact and accurate. He also tells of a »letter» he saw stuck in a cleft pole overhanging the river bank; it was 'written' on birch bark and was a small map of the country with arrows indicating the writer's direction, some crosses to show where he had camped and a large cross marking his intended first winter headquarters (cf. 589). Near by was a small birch bark roll containing a little tobacco. The Montagnais is thus a master at drawing detailed maps on birch bark; LOW's excellent map of the enormous peninsula of Labrador is largely based on the Indians' 'pot hooks'. This skill is quite surprising and original, for when he draws a caribou he likes to begin at the tail. The only other artistic expression I came across was in their beaded embroidery of which the patterns are traditional and which reveals a great sense of colour harmony.

Most illustrative of his mentality is the Indian's love of sitting on a slope and talking all day long (cf. 168). It is said of the people of Labrador: The fishermen think in split cod, the Eskimo in seal and the Indian in fur-bearing animals; start this last subject and the vocabulary of the Montagnais will not be exhausted until hunger drives him to get up.

The Indians are all hunters and some of them fishers too. Their world is thus different from our own, and one gets quite another impression of his energy and endurance when one sees him hunting. When the Montagnais gets 'caribou fever' he becomes the true savage. His insatiable passion has found an outlet, and he can never let anything in the way of game pass him without qualms of regret. It is then hard for him to suppress his instinct to kill (995). But beyond hunting he seems to have no ambition. It is the same with his sense of order; in this as in much else he resembles the gipsy, not least in his

nonchalance and the begging of his old women. Again, it is safe to say that there is not a truthful Indian in Labrador; they will be most plausible when it serves their purpose better than telling the truth. But they will not steal, says WALLACE; when they are staying among the whites they are allowed to go in and out as they choose; and the H. B. C. manager at North West River told me there were never any thefts during their visits to the village. But the villagers shook their heads; some of the trappers know from experience that many things disappear from their tilts in the lonely forests once the Indians have discovered it.

Of course the white population differ in their opinions of the Indians, but the latter naturally differ in character and talent Those who have only seen the Indians of the Gulf coast cannot easily appraise the northern Montagnais; and the Montagnais in the wilderness is quite another fellow from the one who visits the trading-posts. When the local inhabitants assert that the Indians are unreliable and dishonest, doomed to eternal pauperism because of their laziness, they may be right. On the other hand many of the North West River trappers are also right in their opinion of the Montagnais; they speak their language fluently and often have the most intimate association with them in the wilderness. They say that the Indian would never hesitate to give the white man food if he was in distress out there. One of my puritan trapper friends who was evidently unusually captivated by them and who had, as I found, won their hearts, told me he considered they merited our deep sympathy and full admiration: 'the Indians are such good people that the Christian ideals of goodness cannot be imagined more fully realised anywhere on earth than in their communities' and he added: 'their language contains no swear words'. Two centuries ago (in 1731) the Jesuit LAURE, who was indeed the first educated white man to have contact with the Naskaupee, said that an outsider could not imagine the goodness of these Indians. These statements undeniably give a stranger much food for thought when he is unable to form an opinion directly because of his ignorance of the Montagnais language. It is also said that the Indian was honest until he met the whites, and is mostly so still in the wilderness; there they live according to their lights which are those of the untutored savage who knows nothing of the civilization in the world outside (995). I do not know if there is a single Montagnais in the North West River group (see farther on) who can read or write.

Let us now consider more closely the life of the Indians in the interior where they show another side of their nature. There they hunt and trap with the utmost keenness. There they show great reserve towards strangers and prefer to be alone. BRYANT (1913) believed they considered the interior as their

particular hunting reserve and that their aversion from strangers was due to their desire to prevent them from spying out the economic secrets of their country and establishing industry where there should be hunting; they had little sympathy with the new form of civilization of which the main task was to search for ores, paper wood, and sources of hydraulic power. If I remember rightly it was CABOT who experienced in a very practical way the Indians' objection to his, to them, mysterious journeys; under cover of night one of them would creep down to his canoe and bore in it small holes through which the water flowed in when it was launched; this was done several times, and the owner of the canoe understood that this was the Indians' tactful way of informing the stranger that his room was more welcome than his company. It is, of course, the bitter experience of the cruel whites of former days, 'coureurs des bois' and traders, that urges the Indian to suspicion, caution, and even aversion when he meets the white stranger in the wilderness. Old injustices are not readily forgotten by a savage society.

Yet an unwritten law of sparsely inhabited parts all over the world is hospitality and the Montagnais tent, too, is always open for any hungry Redskin or trapper who wanders in over the threshold, and if there is anything to eat he is offered it. But one must know with whom one is faced. When in the wilds I met Indians I had met earlier I noticed no trace of reserve, unless among the children, who are not so accustomed to seeing strangers. When I visited an Indian camp unexpectedly the youngsters seemed to take me for the 'Man of the Woods' or some other horrible creature; they sprang up into the trees like cats and gazed at me from behind the branches, whistling and clacking their tongues to each other. But after I had talked with their elders a while they came down again and joined the ring around me, silent and abashed; sometimes one of them would even come and feel my coat.

Thus the Labrador Indian is something of a psychological paradox to the white stranger, who can never compete with him in endurance and agility in the wilds. But in mentality he seems to have stopped in the forecourts of civilization at the stage reached by a Northern boy of at most 14 (cf. p. 447). Certainly this must be the standard of comparison for many of the curious sides of his habits and customs. Cf. however 876.

Distribution of small Indian groups over the taiga.

The geographical character of the taiga (p. 339) is only very roughly known. Quite a lot of mystery always surrounds the existence of the Indians isolated

on the plateaus. 'On their hunting-grounds in the interior the Indians wander hither and thither during the greater part of the year so that it is not easy to get to know their customs and abodes', I was told by the whites on the coast. The statement is very suggestive, though implying an exaggeration; it is certainly true that the organized hunting nomadism of olden times is on the wane but the basic principles of their occupation can still be traced fairly clearly. The hunters still spread out in small parties quite systematically so that every section of the wide forest is exploited. Here is an attempt to describe the system.



Fig. 259. Father O'Brien, the Indian missionary, performs the Latin Mass for the Montagnais Indians in the Roman Catholic chapel at North West River. Photo E. H. Kranck, July 20th 1937.

In that part of Newfoundland-Labrador held by the Montagnais they are divided into two large groups called: the Gulf Montagnais and the North West River Montagnais. An off shoot of the latter are the so-called Davis Inlet Montagnais who now form a separate group. The names are taken from those parts which the Indians visit in the summer to meet their priest and do business.

The North West River Groups.

These Indians normally visit the trading-station of this name once in winter to sell their skins and buy food, and once in the summer about the 20th July, when they gather to meet their spiritual advisor who arranges church services for them and administers Holy Communion to them, and also to supplement their food stocks. On this second visit the hunters are accompanied by their families; cf. Fig. 260. It was just during their summer visit to North West River that I met them for the first time.

This group comprises 35 to 40 Montagnais families, or rather perhaps tent parties, who visit the station in summer. In winter their numbers are somewhat larger, for then some Montagnais Indians also come who hunt far

away in the interior and who therefore go in the summer to different places on the Gulf of St. Lawrence between Seven Islands and the St. Augustine river for their spiritual nourishment and their business.

When at the end of July these people move back to their hunting-grounds the families spread out in the following way; cf. Map, Fig. 253:

1. About 10 families go to the Mealy Mts — Kenamu River district; there they live on caribou and any other edible game. They wander as far as to the sources of the Eagle and Eskimo Rivers until they come upon the trapping grounds of the white trappers of Dove Brook, from which they wisely



Fig. 260. The season's first Indian tents pitched at North West River July 4th 1939; looking from north-east. In the background in the forest is the Indian Chapel. Aerophoto the author, 1939.

keep away. From the end of October they set their traps for the fur animals in the wooded valleys round the mountain group.

2. About 4 or 5 families go to the surroundings of the Hamilton River but at the farthest to the mouth of the Minipi River.

3. About 5 or 6 families move to the mountainous country round Goose [Bay] River.

4. About 7 to 10 families go to the district round the Beaver and Susan Rivers, wandering thence away in towards the district around Mishikamau Lake.

5. About 5 to 8 families move up the Naskaupee River valley. Here they separate into (a) those families who continue north-west towards Mishikamau Lake and the source of the George River, while the others (b) make their way during the early part of the year over Lake Snegamok to the mountains west and south from Hopedale.

These 5 b families have gradually been increased by those who formerly spent the winter to the west and south-west of this district so that sometimes they number 15 or more. Some of the added families have belonged to the Gulf Indians, others even to the Naskaupee from Ungava: some of them still spend their summer on the Gulf coast and their route now lies over the upper course of the Hamilton River to Ashuanipi Lake and thence, as before, along the Moisie River to Seven Islands. It is, however, now more usual for these families, too, to visit the Davis Inlet factory in the summer to trade. Tent parties of the early pioneers are said still to visit the North West River sometimes in the summer.

— As appears from the map, Groups 5a and 5b keep to what is well known to be old Naskaupee territory. Group 5b is specially interesting as showing how easily natural causes give rise to an internal displacement of people among a primitive hunting folk. Just before the end of last century a number of Montagnais tent parties used to move for their winter hunting up the North West and Naskaupee Rivers to their sources and those of other rivers rising in the neighbourhood but flowing out into the Atlantic, thus the area between Hopedale and the George River sources south of the Notaquanon River. This country had been to a great extent destroyed by enormous forest fires and was for a long time quite empty of game, while in those parts not destroyed the caribou were very uncertain and even the fish few. For this reason the Naskaupee had abandoned it although it was their ancient possession. When, however, the Montagnais discovered that the Naskaupee had definitely abandoned the just mentioned lake area, and that the caribou were returning with new plant growth, some families moved thither from North West River. Rumour soon spread the news and the number of these families increased from half-a-dozen to some fifteen or even more because some of those who had regularly moved from Seven Islands to the Lake Plateau (Mishikamau) now joined the pioneers from North West River. Thus arose a new group: the Davis Inlet Montagnais also called the Davis Inlet band. Several times in the winter and late summer they would visit the trading posts on the Atlantic coast and then they beat out new tracks through the Notaquanon River valley. The tent party who used to visit Seven Islands and had first kept to Mishikamau Lake followed this new track over the Hamilton River to the Gulf coast; it was easy and protected from the wind, running wholly through the woods. For some time the pioneers' parties continued to move to North West River in summer.

Group 5a usually goes under the name of Grand Lake or Mishikamau Indians, or Mishikamau band.

The Montagnais now never come to the areas east of the meridian running through the eastern end of Snegamok Lake; one family certainly hunted in the district between Double Mer and Makkovik in the winter of 1938—39, but that was an absolute exception. They have deserted this part of the country because the white trappers and the Eskimoes have begun to take possession of it for their fur paths.

Very seldom or never did any of the tent parties 1 to 4 and 5a move down in the summer to the Gulf of St. Lawrence, though one or other of them have visited the trading-post at Davis Inlet. It was also very rarely that any of them wandered out to the barren grounds, the tundra caribou there might be an attraction but then they would miss their valuable fur animals.

The new development of 5b (cf. p. 654) appears to some extent as a transfer to

The Gulf [or Musquarro] Groups, also called Canadian Indians.

6. About 15 families now move up the St. Augustine (or Menshen) River to their hunting-grounds in the great forests in the tract between the source of this river and those of the Paradise and Eskimo Rivers. For many years the St. Augustine River has formed the main canoe route of the Montagnais to the Kenamou River falling into Hamilton Inlet; by it the Indians can journey from the Gulf of St. Lawrence to this inlet in seven days. The St. Augustine River Indians also moved to the Eskimo River's sources in 1938—39; on the other hand the land to the east is said to have been abandoned by the Indians long ago (cf. p. 611).

Some of these families would cross the watershed and move some way down the valley of the Traverspine River. Wallace (995) stated at the beginning of our century that this group traded both on the Gulf coast and at North West River. Speck (873) describes the hunting as usually carried on in companies — a few hunters in family parties. According to Cabot (123) the large group divides into smaller parties towards spring. In the 1860's Packard (716) affirmed that these Indians were wholly dependent on the caribou; and also Low (588) says that in the 1880's the caribou was the chief object of this group's hunting, and fur-trapping of much less interest.

7. About 20 families follow the Olmanoshibo [= East Romaine] or Menshen River up to the hunting-grounds round their sources, whence they spread a little way over the watershed down into the Minipi River's valley track.

8. About 25 families hunt around the upper courses of the Natashkwan and Minipi Rivers but they may extend their movements even to the Hamilton River. In the winter the men visit North West River to trade, leaving their families in the interior. Natashkwan was formerly a great seal resort because of its gently sloping beach; for this reason some white families formed a settlement there and this attracted the Indians. It is said to be the mission which now draws these families to Musquarro. According to Speck these Indians hunt in the upper course of the river in large family parties till late in the winter when they divide into separate families.

9. About 50 families keep near Mingan in summer: the islands of Mingan have long been a great haunt of sea mammals and attracted Indians. When moving inland they follow the Romaine River to the portage at the watershed towards the Lake Plateau and Attikonak Lake, thence to the hunting-grounds lying near Ossokmanuan Lake and the Hamilton River.

10. About 35 families are now to be found in the summer at the mission and trading centre at Seven Islands so often mentioned. When moving inland they follow the Moisie or Big River, the Indians' Miste'shibo [= Great River]. For centuries it was a veritable artery in their life and still forms the natives' main line of communication between the coast and the interior. On the other hand it has lost its earlier importance as an inter-Indian trading route, when the Indians moving up the Moisie River continued as far as Ungava Bay; cf. HIND's map and description; see also LOW.

According to information given to SPECK some 10 families (10 a) live in winter round the upper course of the Moisie and hunt away towards Mingan and Attikonak Lake. Some of them even hunt as far as to the sources of the Hamilton River and round Ashuanipi Lake, while some hunt south of the water divide. Here they carefully observe family rights in the hunting areas.

The other hunter families move along the sources of the Koopasho and over a portage to Ashuanipi Lake and the Lake Plateau as well as further north.

(10b) About 6 families remain in the west and south-west parts of the Lake Plateau (SPECK's Petitsikapau Band).

(10c) About 13 families move on to the northern part of the Lake Plateau and wander between the Hamilton River and Mishikamau Lake (SPECK's Mishikamau Band).

(10d) Finally a number of families move on as far as the tract between the sources of the George River and Hopedale (cf. 5 b above).

Seven Islands Bay or Chi'sche'dec Bay has always been a great Montagnais rendezvous because of its strategical situation. It has been a nodal point between two great Indian lines of communication with the interior and even across to Hudson Bay. In 1671 there were routes from the Saguenay and Moisie Rivers to Hudson Bay. The bay is connected by a long, deep valley with Lake St. John 300 miles to the south-west, a great meeting-place of Indians in olden times during their winter moves. It is also not far from the Moisie River which once formed part of a canoe route to Hudson Bay. In the spring and at the approach of winter myriads of ducks, geese and swans used to gather here and even sea mammals. CARTIER, who visited the Bay of Seven Islands in 1535, found it one of the most sheltered anchorages on the north shore of the Gulf and tells a marvellous tale of fish shaped like horses [walrus] spending the night on land and the day in the sea; LESCARBOT in 1609 called them 'hippopotami'. At Mingan there is a Walrus Island. The walrus, now never seen in the Gulf, was once

common up to the mouth of the Saguenay (435). The Indians when visiting the Gulf coast during the summer months lived on the harbour seal; their flesh is not unpalatable, HIND noted. The Montagnais hunted in the Bay for centuries because of its swarms of wild fowl.

HIND reports that in the summer of 1859 500 Montagnais had pitched their tents at Mingan. They came there from all parts of their wintering grounds between the St. John's River and the Straits of Belle Isle, some in canoes, others in boats purchased from the American fishermen, others again on foot. He says that the rioting and debauchery resembled the war dances which centuries before were performed by victorious warriors around their tortured prisoners.

Only a brief acquaintance with these groups is needed to convince one that their subdivisions are not distinguished by stability; the numbers of the hunter families vary from year to year with the movements to and fro. But their territorial occupation can also vary somewhat by reason of the varying supply of game.

The Gulf Indians move in their canoes up to the sources of the rivers lingering much on the way. In the lower parts of the valleys running into the Gulf they can no longer earn their livelihood, for the white trappers have now taken possession of those areas. In this way a kind of conventional boundary line has arisen there and in those valleys running into the south-eastern part of the Atlantic coast. North of Hamilton Inlet the line is vague and irregular but the tendency is for the white trappers and the Eskimoes to extend their grounds further and further up the valleys as will be described later (p. 649 sq.).

In Fig. 253 I have tried to indicate the movements of these different groups, but it was naturally impossible to avoid their being very schematic.

It must be considered surprising at first to find that on the map (cf. also p. 650) the Montagnais no longer spread over the south-eastern part of Newfoundland-Labrador south-east of the Mealy Mts district. From what I learned in Henley's Harbour it is by pure chance that the Indians come down even to the mouth of a river some fifty miles west of Forteau Bay (Napetipi River?) whereas the St. Augustine River is visited regularly. Trappers who carry on 'furing' in the wooded valleys running into the Straits of Belle Isle's north-west shore, e.g. Chateau Bay, have told me that they know the Indians do sometimes come down to these tracts; they have there visited the trappers tilts and the latter have lost their winter stores. In the summer of 1937 also, there was an Indian at Hope Simpson on the Atlantic coast trying to find work, which showed that he was not quite unacquainted with the neighbourhood. Yet there is no regular Indian trapping here. The reason is said to be partly that the caribou are very sporadic, and partly that people from Newfoundland

come here again and again with their traps and snares and greatly decrease the supply of game.

The Gulf Indians too sometimes, pay short visits to North West River to buy food if they need it. But there is nothing regular about this; the H. B. C. like them to sell their skins at the stations on the Canadian side and the buyers in North West River (Thévain, Faquit, Revillon Frères, and H. B. C.) have agreed to pay similar prices, so the Indians have no advantage from selling their products at this station.

Annual cycle of economic life.

The country occupied by the Montagnais is poor and anxiety for earning possibilities drives them ever restlessly forward; it may also be that desire for change or even old habits are contributory causes; it has been said 'the wanderlust was in their blood; their birch-bark canoes were their second home, they read the secrets of the woods like an open book' (514). Their stoppages were mostly short; if they stay in one place more than a week it becomes so dirty with refuse and excreta that discomfort warns them to move on. If someone has fallen ill at a place they are only too anxious to move away, to escape the evil spirits, they say; so they roam again, month after month, year after year, even if the game does not compel them to do so. Yet for most of the camp families the main tracks of their movements remain much the same.

Let us now try to imagine the annual cycle of the Montagnais Indians' life.

The Gulf Indians.

I shall consider Pierre Gabriel's movements as a typical migration; he belongs to Group 10; cf. Fig. 253. I met him at Kalle'koane'kau on the Lake Plateau and he told me of his movements etc. in fairly fluent French.

Move to the hunting-grounds in the autumn.

They move to the hunting-grounds in late summer. When the care-free days at the coast with their feasting and loafing near their end the Indians begin to make their purchases. After many discussions they get ready for the journey. Pierre's group generally breaks up at Seven Islands about August 10th. They move up the Moisie River and usually two families go together; thus they are sure of mutual help in case of sudden illness or accident, when a small family would be unable to procure food or even to watch their nets

and traps so long as »the evil spirit is raging» and the men of the camp shake with fever. It is also well to have the help of others in carrying the baggage at difficult places. Though once it happened that Pierre and his family travelled quite alone. The number of individuals in a camp is carefully thought out and must not exceed what the supply of game can feed. That is why Indians are only found in large numbers during their summer visits to the coast or when gathering in parties to hunt the caribou.

The Indian is a poor man, yet the outfit he takes with him on his journeys (tent, bed and other clothes, food, tools and other gear, new traps etc.) amounts to quite a fair amount at the start. Though his main food still consists of nature's gifts — fish and game — yet he must now also have flour, lard, sugar, etc. with him, and they are quite heavy. To carry all this equipment up to the lake plateau a family with, for example, three children will need 2 to 4 canoes according to circumstances. The loads must be reduced to the minimum possible; the portages will be arduous, and the larger baggage must be moved by stages; the canoes bear a load to the end of one stage of a few miles, leave it there and drop back for another. If anything is abandoned it is part of the food store. It is no picnic to ascend the Labrador rivers.

In the open season travelling in canoes is more or less comfortable; the Indian does not walk much in the summer, the forests are too thick and full of rubbish, he thinks: he just steps into his canoe which in the wilds takes the place of both cycle and motorcar. Since childhood he has known the rapids, the dangerous rock snags and the foaming eddies; in time he becomes daring in shooting even difficult rapids. It is fine to see him sitting on his heels in his canoe, paddle in hand, diving into the whirling spray. He himself delights in this and his experience from boyhood up has taught him how the power of the water increases rapidly with its speed. A slight change in an eddy may swamp the fragile craft, bring it under the fall or break it on a rock; indecision may prove fatal. Yet I never heard of a serious accident. It is not the easiest thing to balance a canoe, but after an Indian boy has hung on to the upturned keel a few times, with the food and other baggage floating around him he soon becomes a real boatman. Again, to lose the canoe would be almost equivalent to losing the lives of the whole party, for it would be almost impossible to reach the coast dwellings on foot in summertime. In winter most of the difficulties of such a journey disappear for then the route lies over frozen lakes and rapid progress can be made.

All this shows that Gabriel and his company have no easy journey. The canoe must be paddled, poled, or tracked. Tracking lines are attached to the bow of the canoe and are drawn by a man ahead, floundering forward, but the heavy growth of willow lining the banks soon forces him into the cold water, where the swift current makes it very difficult to keep a footing upon the slippery boulders of the river bed. If the canoe hits a submerged rock the travellers may easily find themselves in the rushing, seething flood rolling down through the rocks. It is a cold business in late autumn to push the canoe, inch by inch, up

the opposing, rock-filled waters; it demands a hardy fellow. The rapids seeth hither and thither between and over stones and heaps of rubbish in which the canoe rope can easily be caught. Inch by inch he who draws the canoe struggles along against the current, bent almost double, fumbling for foothold. Sometimes he falls into a deep hole and the canoe towing-rope is locked firmly. But the Indian boatman well understands how to avoid the many sand bars and the partly submerged stumps and logs here and there; boldly he twists his canoe between them with his paddles. When the stream becomes too full of obstacles he picks up his canoe and carries it. Again, it is no light task to bear the canoe over the steep portages where the path is only roughly hacked out in the thick brushwood of the forest, in many places over high mountains. However, along the Moisie River there are many well-worn portage paths round the falls and rapids proving the antiquity of this highway route from the Gulf to the table-lands of the interior (map in 435). But the Indian is strong; it is said that he finds it no trouble to carry a 198 pound barrel of flour over a 3 to 4 mile long portage, and even heavier weights over shorter stretches: 'just for badness'. He also has learnt to solve the carrying problem; the centre of gravity of the burden must follow the middle line of the body and this is well achieved by placing a carrying strap round the forehead. Soon habit becomes second nature.

Often the equipment of a company amounts to half a ton or more and must then be transported in lots from one stretch of slack water to another. If a storm arises in a river lake there is nothing for it but to land and wait till it is over, for with only a few inches free-board from the surface of the water it will soon ship so much that it capsizes or sinks, and certainly no Indian can swim. Yet on the whole the canoe part of the journey goes quickly; the daily rate including stoppages is estimated at up to 20 miles per day.

To economise the stock of food taken Pierre's family during the journey live mostly on fish; they use ordinary gill nets some sixty yards in length.

Only after a month and a half of paddling and poling does Pierre arrive at his first big stopping-place: Ashuanipi Lake; there the family takes a rest. They now feel at home and there is no reason to hurry.

Thence they move comfortably further north along the watercourse from lake to lake to Petitsikapau Lake, though sometimes they are delayed against their will by the crossing of the lakes, which can be troublesome: Lake Mishikamau especially has a bad name for heavy seas and high waves which may keep them on its shores for long periods because no canoe could weather them (995).

Now the wilds lie open to them and they can move about it at will only avoiding collision with the white trappers. In talking with different Montagnais I learned that nowadays the different families do not, as formerly, feel themselves confined to certain hunting tracts which were theirs of old-established



Fig. 261. Camp of the Indian Mishikamau band about three km south from the outlet of the Naskaupee River in Grand Lake. Photo the author, Aug. 14th 1937.



Fig. 262. Tents in the Indian camp of the Mishikamau band. Photo the author, Aug. 14th 1937.

or inherited rights and respected by the others. For the greater part of the time the Indians now live as separate families or groups of some few families; on the 10th January 1931 a group as large as 5 families came to Mud Lake (644).

There is no semblance of a regular camping-ground. The shore of some large lake with islands is preferred, and what they like best of all is an island with an extensive view so that the game can be seen far away from the tent; perhaps also this choice is a tradition from when they needed to be on their guard against surprise by an enemy. A similar reason may govern the selection of the edge of a great bend in a river. The traces of an Indian encampment are not easily distinguished in the landscape; the tent poles rot away after a few years and even the tufts of grass which soon grow up look just like an otter-meadow. Sometimes a *lobstick* (a spruce tree with the lower branches lopped off) is seen, but I did not discover that this had any special connexion with a camp. The chief thing in choosing a camping-place nowadays seems to be the possibility for someone always to be able to watch for booty, when the hunter lies on his back on a caribou-skin, sleeping or smoking, and his squaw works on the ground surrounded by the dirty children.

The Indians sometimes stay in the t i l t s or blockhouses erected by the trappers on their hunting-grounds, but it would never occur to them to put up a fixed dwelling for themselves. The only protection against the elements which the Indians have is the linen tent — Figs 261, 262 — in summer a cool and airy dwelling but in winter as cold as a cellar even after it has been covered with deerskins and then with thick layers of snow. Sometimes they content themselves with an improvised *meetchwop* (p. 639).

Nor do the Montagnais systematically lay in a store of food; they build no *caches* like other hunters which would remove the need for carrying large amounts of food on their long journeys; it just never seems to occur to them to do so.

L i f e i n a u t u m n.

From Petitsikapau Lake Pierre's company bends south-east to Sandgirt Lake, and on this stage, too, they lay out their nets in the fish-filled waters. At this period trout is plentiful but later the fish retire to deep water beyond reach of the nets. Hunting in the woods also decreases in results as the leaves begin to fall, though fortunately there is the ptarmigan to relieve the necessities of the band.

From Sandgirt Lake the Indians using Pierre's route spread out in different directions: away to Mishikamau Lake and even to the Notaquanon River or the Hamilton River. While waiting for winter to set in Pierre himself generally paddles away to the mysterious hunting-grounds around the sources of the George River which he still considers as his family's hereditary possession; but sometimes he goes trapping to Mishikamau Lake or down the Hamilton

River. A round like this usually takes some months, but he tries to get back to Sandgirt Lake before it freezes.

When the cold starts Pierre sets out his traps and snares for birds and other small game — hare and porcupine. Hares — in Labrador called rabbits — and porcupines formerly existed in large numbers all over the country and the Indians told HIND that the former used to be one of their most reliable sources of food and were very easily caught both in winter and summer. Their disappearance has been largely instrumental in causing the Indians to leave certain districts. Yet the hare is poor as food and, compelled to live on it alone for months, they soon become weak, emaciated and prone to disease.

In early October the caribou — *athen* — collect for the rutting-season at places lying beyond the water-divides and round the sources of the George and Kipekak Rivers; the hunters therefore go there and kill many animals; (from the airplane I could see that the country in the former area was more closely crisscrossed with deer paths than I have ever seen anywhere else in the world; clearly there are tremendous migrations of the animal). Especially Mishikamau Lake has been a regular autumnal rendezvous of Indians since very old times. Tent poles of all ages, log caches, 'sweat holes', cairns, signal fire places, etc. are still there in great numbers (995). The country is low and swampy and surrounded on all sides by bare mountain summits. In open country rows of branches or brushwood, in forests strong fences forming the sides of an acute angle lead the caribou to an enclosure. In this at certain intervals are openings where snares of babiche are set up, in which the deer, trying to escape through the openings, is captured. The other animals run blind with fear into the enclosure, where the hunters watch and kill then with guns or lances. — It is just the same converging rows of brushwood, sticks with a head of peat, piles of stone, etc., which formed the *hangas,* that were in use for the same purpose still a century ago in north-eastern Lappland. In the rutting time the bulls are decoyed towards the hunters.

After returning from hunting the caribou camp is pitched for a short period while waiting for the lakes to be definitely frozen, which generally happens in early November. Now there is much to be done in a short time; the winter gear must be examined and mended, the traps set, the canoes laid up and covered with brushwood. The snowshoes always need some repairs and the sledges and *tabanasks* [= toboggans] generally require patching. All these are the men's jobs. The squaws dress the caribou skins with the animal's brains which are kneaded into them; then they are dried, washed in warm water and stretched and afterwards worked with a bone chisel to scrape away the hair; if the skin must be made into moccasins, she must also smoke it.

Tanned, unsmoked skins are cut into thin strips — *babiche* — the Indians' universal material used instead of belts and string; it forms the plaited work of the snowshoes, it binds together the sledge bottoms, it forms the nets and fishing-lines. The sinews of the caribou's back are dried, split and wound round the thigh-bone to be used as sewing-thread, *sinew*. It is difficult to imagine how the squaw manages to do all this in the bustling, hurrying time.

Life in Winter.

When winter has really started the long journeys on foot begin. In the endless forests where no surveyor has ever tramped the Indians' work in transporting their baggage is worthy of esteem. The continual moves from one place to another can, in the course of one year, amount to 1500 or 2000 miles, and all the means of transport at their disposal are the same as in ancient times — canoe, tabanask and snowshoes or his own back.

The winter life is varied by constant change of camping-ground; a few weeks in one and then a move to another perhaps two or more days' journey distant.

When snow covers the trails travelling is not so easy; the family must take to snowshoes and drag all their baggage on the tabanasks. This little sledge is made of boards from birch or larch bent up in the front and bound closely together with strips of babiche. A tabanask to run on a thin covering of snow is 16 inches (40 cm) broad, a quarter of an inch (0.6 cm) thick and 8 feet (2.5 m) long. When the ground is frozen and hoar frost or a little snow is lying the tabanask can be used just like the Lapps' *akja* and the *veturi* of the ancient Finnish hunters; it glides like a ski in deep snow; the baggage is collected in a skin or sailcloth sack and bound fast to it. Dragging a loaded toboggan over snow on cumbersome, circular snowshoes is not easy. A white hunter would never try to drag such a heavy load as the tabanask carries — a trapper told me, sometimes it amounts to 100 kg. It is considered amongst the whites a hard day's work for one man to pull so much over dry, floury snow for 10 miles; yet a rather weak Indian can be expected to carry about 70 kg. When travelling in mid-winter nearly every member of the tent party has a separate sledge. At the head of the caravan tramp the strong men on their creaking snowshoes, then come the women, the old ones and the girls of 12 to 14 years all have their own tabanasks and all dragging with all their might. The old men come next, some of them dragging sledges; last of all come the youngsters. But ahead of them all, half a kilometre in front of the coil of sledges, tramps for all he is worth a 14—15 year old boy, proud to be 'the leading dog in a span of dogs', it is said. The mist of his sweat often hides him somewhat but the track

shows a certainty as if he could see through woods and mountains, and he does this all day and in all weathers. In this way the Indians travel from morning till night without stopping, day after day, winter after winter. No meals are provided: Eat light to travel far, say they. Often the family has to go to sleep on empty stomachs when darkness falls, and often they are compelled to leave their hard night camps without having broken their fast. Generally a hunter starts off half-an-hour before the caravan in the hope of procuring some game, but if he fails there is nothing to be done but suffer the hunger. But it is said that this soon affects the muscles and gives rise to a drowsy slackness when trudging hour after hour in snow half a meter deep with the freezing land monsoon piercing one's clothes. Yet give the Indian a drop of tea and a lump of dried meat or deer-fat and he is all right again and quite pleased with things. INGSTAD said that the Indian of Canada is fortunate enough to be able to stop thinking, and this statement may also be applied here.

Of animals it is said that when it is really cold they creep down and lie in the snow, and fresh tracks are rare. The Indian on the other hand does not bother about the temperature or wind, his insensitiveness to them is extraordinary. The times of the moves are decided by the leader and he is obeyed. When a future hunter makes known his desire to join the party, they stop for a day or two, but shortly after the new baby has seen the light they go on again. When the great cold makes the snow rough a sealskin is slipped under the tabanask and it runs as if on oil.

The Montagnais' little, long-nosed 'cracky dog' is invaluable to the hunter; cf. Fig. 262 (870). Yet many people may be surprised that the Indians have no draught animals. Large dogs are not kept by them as a rule, partly because of the food they require and partly because the cunning huskies soon learn to rob the traps. Only a few Montagnais are said to keep a span (1—2) of dogs, but the Naskaupee are said to be better-off: they move about in districts where caribou meat is plentiful; many of their families have a komatik with a team of huskydogs. The use of the dog as a beast of burden is unknown in Labrador. A tamed reindeer — Fennoscandia's 'ship of the winter wilderness' — would be most useful to the Indian.

Life in winter is governed by hunting, which is considered the only worthy occupation for an Indian. No law prevents him hunting and fishing where he chooses, though in these days he must observe the close seasons.

A new great tour is made when the snow cover has formed and the fur-animal traps are set around the lakes in a line which may be thirty miles long

and take a week to visit. The family first lives chiefly on the flesh of these animals, and on hare, porcupine and birds caught in the snares and on ice-fish. At the height of winter — the best hunting time — they also get caribou meat, and food is in better supply. Sometimes there are feasts when caribou are killed, and the men eat so much that they are half-stupid the next day. If again the weather is bad the men remain at home starving and devote themselves to making and repairing tools and utensils.

The whites say that the hunting of caribou is still the mainstay of the Montagnais' existence, as HIND also once wrote; he included the Naskaupee in his note and compared the importance of the caribou here to that of the buffalo to the Prairie Indians. I am not convinced this is right nowadays (cf. above and p. 422 sqq.).

The American caribou is considered the fiercest, fleetest, wildest and shyest of all reindeers, so much so that they are rarely pursued by white hunters or shot by them except by good fortune. Indians on the other hand have the patience and instinctive craft to enable them to crawl up to them unseen and unsmelt, for the nose of the caribou can detect the slightest taint upon the air of anything human at least two miles up wind, says HIND (435).

Nowadays the hunt mostly takes the form of a drive which requires a special strategy. When the snow lies thick and soft in the forests the Indian on snowshoes hunts the caribou with good results; the animal sinks deep into the snow, the hunter trails the animal and runs it to exhaustion. Different rendezvous are chosen from which a good lookout is possible so as to see the signal fires by night or smoke pillars by day which announce the presence of a hunt or a herd. When the caribous are discovered some young men are stationed at certain points to drive them into a pass where the hunters form a shooting-line, thus making certain to kill some of them. — All the boys above the age of 14 to 15 take part in these hunts.

I do not know whether pitfalls are used when hunting caribou.

February is said to be the best hunting month. When the snow lies meters deep and is covered with a slight, icy crust the caribou fall through it and have difficulty in escaping from the hunter on his snowshoes. The Jesuit chronicles tell of several cases when famine has ravaged large areas because there has been little snow.

The result of the hunt may be hundreds of caribou. It is the property of the whole band and is divided between the hunters' families according to traditional rules; in this way communism prevails in regard to collective caribou-hunting. In respect of other game the rule seems to be that those present

at the death share in the booty, while all that is taken in snares or traps belongs entirely to their owner.

Sometimes one hunter alone, or with a single comrade, starts off to hunt caribou. He picks up and follows its tracks—most easily in February or early March when a few inches of fresh snow has fallen, which also is a good support for the hunter who can from the leeward side creep up to the pasturing, wantoning deer. When the hunters have stolen upon a herd they either finish an animal by a sure shot, or the game takes alarm and starts off on the jump, when the hunt must be given up in despair.

Other methods of the Labrador Indians in hunting the caribou can be found in CARTWRIGHT's writings (134). It is most interesting to note that a similar strategy, similar methods and the same periods in hunting caribou were to be found among the Skolt Lapps in North Finland a century ago.

Co-operation in hunting the bear has also been usual among the Indians. But this animal is not so often pursued even at the present time, perhaps for fear of upsetting his powerful spirit.

Small game, such as hare, porcupine and birds are not considered worth hunting by the Indians unless there is a lack of snow and the caribou and fur animals are few in number.

The fur-bearing game on the other hand the Montagnais hunts with the passion of a wild animal. He has greatly developed his methods and equipment, for which I refer the reader to LIPS (579), CARTWRIGHT (134), and LOW (588). Fur-trapping is carried on between the end of October, when the skins are thickest and darkest, and the end of March. The Indians have taken more interest in it since trade in its products has been arranged by certain firms and the natural economy of the natives has been supplemented by the white man's goods. It has finally become at least as important as caribou-hunting; the skins are in demand at the trading-store, and in exchange for them the Indian can get ammunition, clothes and food.

The trapping-grounds of the Montagnais lie wholly within the forest area where the most valuable fur-animals are found. The beaver, for example, is never found outside the connected woods: in Davis Inlet the Indians never have beaver-skins to sell; on the other hand in some winters they can bring in 40—50 skins of marten and mink, something which is very rare in Nain. For comparison it may be stated that in North West River, which is the staple-place for skins from the forests of the central districts, not very long ago a thousand beaver-skins and several thousand skins of marten and mink used to be traded every winter.

Among the Naskaupee things are different; skins of the caribou, the fox, and the seal are the most important articles of sale to the northern trading-posts,

Nain and Hebron. The white fox is especially valued and is trapped by the Naskaupee in the barren grounds and the Eskimoes along the seashore and on the ice edge. Sometimes in the barren grounds there is a shortage of hare and small rodents and then the foxes abandon those parts and make their way to others where they can find their customary food. At such times the Naskaupee would be badly off if they had not the caribou which not only gives them food but whose tanned, shamoyed skin is a good object of barter.

The Montagnais are not so hardly hit if the fox deserts their hunting-grounds, for there are always other fur-bearing animals and game, and plenty of fish in the lakes so they need not starve if only they plan out their life sensibly. Lately, however, there has been a turn for the worse, for it seems clear that the valuable marten is definitely on the decline in North America. This animal lives in colonies and is easily exterminated when its tracks are discovered. As regards Labrador, in former days 1500 to 2000 marten skins would be bartered in North West River during the winter, but 1938—39 only 70 such skins were sold. The supply of beaver is constantly on the increase now after a close period.

I spoke with some presumable experts who considered that the hunting-grounds can still support the present day Montagnais quite well. The Indians themselves say they have not noticed any decrease in the supply of fur-bearing animals except the marten.

When game is scanty and the stomach empty the Indian must fall back upon fish. Lakes and rivers contain plenty of them especially when the frost begins to cover the surface of the former. But the fishing really does not interest the hunter very much. It is therefore the women's task to set out a net near the tent or bait some primitive hooks. Fishing nets are used all the year round; in the winter the nets are put under the ice, but then it is very difficult to dry the nets, and therefore hooks are mostly used. The catch is eaten then and there, the Indian does not think of preserving any of it for the future; he counts on getting caribou meat when the ice is firm and the ground covered with snow.

Yet one kind of fishing does interest the men. To catch larger fish — especially salmon — in summer, in daylight the fish are caught from the canoe with a thin wooden spear with a long metal point and sometimes with two barbs of wood on each side of it, at night he catches these large fish with a torch and a spear with two barbs; this method he calls w a s w a n o. His favourite resort for salmon-spearing by torchlight is the pool at the bottom of a fall.

In early winter fish are caught from the ice by 'jigging'. Here again it is the squaw who works with a primitive, wooden hook fastened to a variegated line on which a whole lot of fish may bob up; a cold method of fishing demanding the patience of an angel! Sometimes the hook is of metal but those of wood

resemble the ones we know from the stone age in Fennoscandia; sometimes even a simple bit of dry juniper is used on the line when fishing for the greedy pike. I have heard nothing from the Montagnais concerning the use of hooks made from antlers. Imported hooks are mostly used nowadays. But ice-fishing is dependent on geographical conditions. Newfoundland-Labrador is very cold and the snow-covering of the ice generally thin so that the ice itself soon becomes six and seven feet thick and it is only with great difficulty that a fishing-hole in it can be kept open. For this reason ice-fishing is not so important for the Montagnais even in famine times, whereas the quadrupeds and the birds are their main support, for the stocks of flour, pork and molasses they take with them are but small and they never think of taking an extra sledge load of them. They just do not worry; if they don't find game to-day they will to-morrow, or some day in the future, is their happy-go-lucky way of thinking.

Someone has said that even when the Indian's stomach is empty, his temper is good. Indeed, if everything said of him is literally true there is in the world no finer artist in starving than the Indian of Labrador. Famine and privation are the main theme and reappear constantly in published descriptions of the Montagnais. In 1670 PATER ALBANEL related that hunger was their great enemy, and FATHER ARNAUD repeated this in 1859: In the spring when the snow had begun to melt the caribou and ptarmigan passed away. The interval between the disappearance of these animals and the arrival of the geese was yearly one of suffering to the improvident Indians of Labrador. If the fish also fail they have nothing to eat but *'tripe de roche'* (p. 343) and broth made from birch buds. When the goose is heard the melancholy faces brighten; the goose dance was therefore a time-honoured custom (943). According to LE JEUNE they had recourse to the inner bark of the birch and caribou moss in times of famine, which seem not to have been infrequent (497). Nowadays famine is never so disastrous as in bygone days; now they hurry to the trading-posts by forced marches and get the white man's food.

The winter life of these savages is thus precarious, and truly the aspect of the country which they delight to call their home is sufficient to cool the ardour of the warmest admirer of a life in the Labrador wilds, HIND concludes.

Life in Spring.

When the trapping finishes towards the end of March, when the sun begins to bleach the fur, the Indian goes on to hunt other game, chiefly the caribou and the porcupine, always supplementing them until June with fish when necessary; the great lake trout, kokemesh, which can weigh 20 kg., is caught by 'jigging', others are caught by spearing in the rapids. If there is a scarcity of food at the end of April and in May even the bear is hunted.

Generally in May a move is started towards the places where the canoes are laid up. The Indian likes to begin to use his summer method of travelling as soon as the ice has gone; and he must get to the storing place before spring really comes and the freshet sets in when it is impossible to ford the rivers on foot.

Arrived at the canoes the families prepare for the spring move. Some of them go to Seven Islands, others to North West River, to meet their priests in the early summer. The way to the Gulf coast is long and if spring is late these Indians make small sledges with runners — *catamarans* — on which the canoes and the baggage are laid and dragged along on the snow-track. Normally Pierre Gabriel can begin his canoe journey to the coast immediately the ice breaks up in the beginning of June. He then goes via Astray and Ashuanipi Lakes. On the Lake Plateau the portages are short and low, the lakes are many and the river stretches between are shallow and short; it is easy to travel. Canoes and equipment are carried over the watershed to Koopasho Lake [= Oath Lake]. Southwards from the watershed the portages are steep and take up a large percentage of the route; this is the 'bad country' of the Indians. The journey down the River Moisie, so full of seething rapids, is made quickly. Generally the Indians must hurry if they are to reach Seven Islands by about 20th June when the priest usually comes to serve them spiritually: read a Latin mass for them, celebrate Holy Communion, baptize, marry, or bury them.

On their arrival at the coast the annual cycle of Pierre Gabriel is at an end.

Indians moving to the hunting-grounds from the other trading-posts on the Gulf coast follow the same principles in the main.

From Mingan they ascend the St. John River, over a high portage to the Romaine River they proceed to Attikonak Lake and thence to the neighbourhood of the Grand Falls of the Hamilton River.

As long ago as the 1850's the Indians, according to Ferland (252), used to begin their journey up the Natashkwan about 2nd September. Along this route the Minipi with its difficult rapids formed the next stage. According to Townsend (950) the Indians used to come to the coast at the Natashkwan in May and move away in August.

Packard (716) relates how, in August 1860, two Indians were catching seal and ducks in the Eskimo River; they must have moved in to the hunting-grounds only in September.

Those families who in summer visit the villages on the Gulf coast east of Seven Islands move thither in much the same way, but as the rivers are shorter the journey is quicker.

At Mingan and Seven Islands there are churches for the Indians. There is also a church at Natashkwan, but the Indians there usually have their services 15 miles farther down the coast at Musquarro. Since 1903 the Roman Catholic Eudist Fathers, who were then expelled from France, have had spiritual charge of the Indians. In the village of Olomonoshibu, one of Hudson's Bay Company's most important trading-posts, there was, according to RICHET (799), a little church; he says that this place used to be visited by 300 Indians who came there to sell their fur stock.

It seems thus that the migrations described above hold good for all the Gulf Montagnais except Group 10 d (p. 610). It is as a rule only in the height of summer that the Gulf Indians are to be met with at the coast.

Variations.

Sometimes the Indians appear on the coast in winter from force of circumstances. WALLACE met some at St. Augustine in the first days of April. They had failed in the caribou hunt and had come out from the interior half-starved a week or so before (995). TOWNSEND tells of a characteristic event from Natashkwan in the winter of 1911—12; some Indians turned up suddenly in February with the corpse of an old woman who had long been ill and died in the interior. Instead of waiting, as they usually did, for the spring journey to the coast, they felt an urge to come down at once, for they feared that the disturbed spirit of the dead would run riot in their district, and the best thing to do was to get her buried in consecrated ground as soon as possible. Even after the burial it was more than a month before they summoned up courage to return to their hunting-grounds (cf. 109).

But other causes may also give rise to variations. The seasonal rhythm is anything but regular; winter may surprise the travellers before they reach Sandgirt or Mishikamau Lake; then they are forced to lay up their canoes on the spot while some of them go back for the sledges on which they can move further. This delay disturbs the hunting of fur animals and their earnings suffer. On the whole it may be said that the forest Indian's life is subject to the same whims of nature as we know so well in that of Lapland's people.

We now leave the Gulf Indians to consider

In doing this we can confine ourselves to the Mishikamau Group (5 a).

Shortly after the departure of the priest in July these Indians prepare to start from North West River. The lodges are taken down, canoes launched and their stock of worldly goods, including food from the store, placed on them for the journey to the wilderness. North West River is soon without Indians, who turn to their rivers and forests with instinctive love.

They move first up to Grand Lake where they camp somewhere at its north-west end. At the beginning of August, 1937, I visited them at the idyllic spot they had chosen — Fig. 261 — in the beautiful poplar forest on a headland on the northern shore, about 3 miles south of the mouth of the Naskaupee River. They generally stay some months in this neighbourhood to build canoes. There the families separate though usually not before the men have together been on an early caribou hunt in the district round Snegamok Lake.

The direction to be followed by the parties after they have separated from the camp is determined by the chief — *wuitsta'mau;* Fig. 254. The principle of circulation, already described (cf p. 632), seems to be followed in the main; each stopping-place on their move is occupied for a few weeks.

The Indians go up the small rivers with their many rapids in short stages. When after a very strenuous journey they reach Mishikamau Lake the watercourses are beginning to freeze.

Here they lay up and cover their canoes, take to their snowshoes and tabanasks and lay out traps for the fur-bearing animals. These Indians, too, get their food chiefly by hunting and ice-fishing. Then, already after a month or two, they go down to North West River to exchange their furs for food and other necessities, and then, dragging their heavily loaded tabanasks, they return to Mishikamau where the younger ones have been watching the traps. These Montagnais seem to be prudent and realize the value of having a good stock of food if the game fails; as they say, if this happens in March when the ice crust on the snow surface can bear, things go badly for people in this poor area. It is a tradition among the Indians themselves that the worst time for food and the greatest need for exertion is just before the close of winter.

When spring comes with a burst, or at the latest when the wild grey geese begin to make for the north, the canoes are taken out again and the band begins to move down in short stages to their summer camp at North West River. In 1939, at the beginning of July, I found there 18 tents with

about 150 Indians, but one family party from Kenamish had not yet arrived; cf. Fig. 260.

This is how life passes among the Montagnais in Newfoundland-Labrador to-day.

Life in olden times.

Pater le Jeune (497), in Relations des Jesuits, 1634, gives the most interesting description of the life and habits of the 'wild' Montagnais of that time. From this and other Jesuit narratives one gets the impression that the Gulf Indian groups were living under conditions remarkably similar to those of the Labrador peoples of the present day — the same winter wanderings of small family groups living on the edge of subsistence and avoiding other groups during their migrations (879).

In 1786 Cartwright (134, vol. III) described the Montagnais with whom he seems to have had not so little intercourse. By birch bark canoe in summer and rackets in the winter they traversed the inland. They used guns and bows, but their chief dependence was on the gun and they were excellent marksmen. They were wonderfully clever at killing deer; in winter time if deer were scarce they followed the herd by the slot day and night until they tired them quite out, when they were sure to kill them all. They killed beaver by watching for and shooting them or by staking their houses and killing them with spears made for the purpose, or they took them in nets placed across a contraction in ponds. Hermit beavers were therefore always observed to be most numerous in those parts of the country which are frequented by Indians.

The Montagnais were also very dexterous in imitating the call of every bird and beast, by which they decoy them close to their lurking-places. And, as the destruction of animals is their whole study, there is not one whose nature and haunts they are not perfectly well acquainted with, in so much that one man will maintain himself, a wife, and five or six children in greater plenty and with a more regular supply, where an European could support himself singly, although he were a better shot. As the people never stay long in a place they live the year round in miserable wigwams covered by deer-skins and birch-rinds having no built houses.

Some eighty years ago Chisholm (435), who for forty years had close connection with the Gulf Indians, described their migration as follows: When leaving the coast for the interior, many families have particular rivers to go up by, and often in a large body. But once a certain distance inland, the whole party breaks up and disperses into bands of two and three families each to pass the winter, and seldom see each other any more until spring. But before taking their final leave of each other a place is appointed to meet [in the spring], and he or they who first arrive at the prescribed rendezvous, if having sufficient food to wait, keep

about the vicinity until the whole party collects. They then go to fetch their canoes, wherever left when the cold sets in, and employ themselves, some in making new canoes, others in repairing the old ones, until such time as the ice breaks up in the large lakes and the waters subside in the rivers. They then move off in a fleet of canoes towards the sea, and generally make their appearance at the coast about the latter end of June.

It seems also to have been usual only some decades ago for the Indians to collect in large groups at some of the great lakes on the south of the Lake Plateau — generally Sandgirt Lake — before beginning their journeys in smaller groups to the Gulf coast or North West River. It was a fine time, seeing each other and exchanging news, or arranging their differences; probably some came from far distant parts, perhaps even some Naskaupee, and there was much to hear and to relate. It seems strange that they should settle their business affairs at such a meeting-place, e.g. at Kanispiskapau L., and not on the coast. But it was probably because not all the Montagnais went so far at that time, and their economic life more closely depended on natural supplies and conditions. Another reason for meeting thus may have been the opportunity for barter between north and south. Some kind of inland trade survived for many years; e.g. trade in canvas for canoes between the Gulf Indians and the Naskaupee, whose country did not supply canoe bark (cf. 123).

To-day it is at the summer meeting on the coast that experiences are discussed and differences settled — all those quarrels which may have arisen during the winter. Public opinion is a powerful force in the Indian community and on its attitude towards him the very life of the hunter depends. He can go nowhere else, for to leave the community means to be outlawed and doomed to starvation (580). The associated heads of families thus form a kind of arbitration court.

Montagnais' summer visit to the coast is presumably of fairly recent origin.

It has been argued that the seasonal migration from the interior forests, where their winter hunting-grounds are located, to the coast or to the great bodies of fresh water to spend the summer there and return to their winter grounds when the season of insect pests, forest fires and drought have ended, is fundamental to northern culture (871). Thereby it is moreover thought that conservation of the game is possible, it allows a quiet period for the purposes of recuperation. During the summer season at their camps beside water these nomads subsist upon fish, water fowl, eggs and, where they come to the

sea, sealing. This undoubtedly holds good for the western Indians, yet I have good reason to think that our Indians in olden times never moved to the coast regularly. It is known that formerly the buyers of furs used to seek out the Indians in their hunting-grounds. Then the H. B. C. set up stations inside the country in order to control the fur trade more effectively. Within the present Montagnais area were established Fort Mishikamau, Fort Naskaupee or Petitsikapau at the northern end of the Lake Plateau and Fort Winnikapau in the Hamilton River valley. Under these conditions the Montagnais of Newfoundland-Labrador had no cause to make their way to the coast. It is said that in those days the life of the Indians in the interior all the year round was healthy and happy, further that the summer was a festive time. They lived by fishing with net or spear, by trapping birds with all kinds of snares, and by collecting eggs and picking berries. New canoes were made. The family vegetated without care for their maintenance or being cold. Rheumatism was less troublesome than in the cold season, and tuberculosis was unknown.

The missionaries, too, at least as late as the middle of last century, sought out the Indians where they collected in the interior (cf. p. 581). There both trade and church ceremonies took place; so why should they go to the coast? If the Jesuit chronicles can be believed the Missions in those days were fairly successful.

Then later when the Hudson's Bay Company closed the stations in the interior and opened new ones at the coasts the chiefs or some of the reliable Indians used to be entrusted with the conveyance of all the furs obtained to one of the Company's stations and the exchange of them there. If I was correctly informed the other Indians even at the beginning of this period lived permanently in the interior; only those whose hunting district was near the Gulf coast used to visit it, to hunt seal among other things.

What brought this Golden Age to an end I have been unable wholly to discover. Some information points to the fact that life in the interior became harder as the use of firearms and forest fires caused the game to decrease. After the middle of last century the habits seemed to change with some confusion as can be traced in HIND's descriptions; the caribou began to migrate differently and hunger drove the Indians down to the trading-posts on the coast, especially the Gulf coast. Here they found the *'oblate father'* or *'robe noire'*, the priest, who gave them Holy Communion and looked after them in many ways, probably giving alms to the poorest. What was the actual cause and what the effect I have been unable to judge; it may well be that the missionaries — as I have heard — found it much more convenient to let large numbers of Indians collect at certain times at certain places on the coast, as

they now do, than to undertake the troublesome journey to their collecting places in the interior and just at the worst mosquito period. WALLACE (995) says that when the Jesuits in 1897 gave up the chapel in North West River this caused the Indians to go down south to the Gulf coast. I find it difficult to believe that the periodical migrations arose from such an event. CABOT (123) alleges that at the beginning of the present century few Indians regularly visited the east coast of the peninsula: For convenience to themselves the 'oblate Fathers' had prevailed upon the hunters who formerly traded at Hamilton Inlet to make the longer journey to Seven Islands. The fact probably is that for both these reasons the annual move to the coast soon became a fixed custom, and now nearly all the families do it unless perhaps some who have been unfortunate and have no fur to sell. Yet it must be remembered that as early as the 17th century many places on the Gulf of St. Lawrence were visited in summer — apparently spontaneously — by Montagnais Indians. But the question is still not clear.

One thing is certain that this custom is most unfortunate for the hunter people. The journeys — often forced — to and fro mean lost time and unnecessary trouble. Thirty to forty per cent of the year is wasted on them; how much work could they not do with their hands in that time? The hardships tell greatly on the well-being of the whole family, especially the children and the old people; for many of them the journeys to the coast are a veritable punishment; one or more goes under with the illnesses of the whites and others carry back to the wilds seeds of diseases which were formerly unknown among them and from which they will never be free — especially consumption.

HIND says he found that the Indians who stay behind on the coast rapidly lost the energy and bodily strength which characterized them when living in the interior, and which were absolutely necessary for the hunters to maintain themselves in a mountainous country thinly stocked with game. Once on the coast their habits soon changed; they learned to live on seal and fish, became very susceptible to changes in the weather and, during the spring, were liable to prolonged attacks of influenza; the young people became consumptive, the middle-aged rheumatic, and death rapidly thinned the ranks of this once numerous and singularly hardened race.

When in September the caribou's horns begin to harden the hunter must again be on the spot, it is said. The Indian is not one to do things in good time, so that when he travels he is always in a hurry and must hasten onwards whether the members of his family are old or young, well or ill, blind or seeing. The danger of accident is then greater than ever and often the lives of all for good or ill depend on the trapping skill and wide knowledge of locality of a

boy or an old woman, though such knowledge does border on the phenomenal. The sick must accompany the rest at the same pace as the healthy. Only after a month's persistent boat-dragging, bearing, and canoe-poling up the narrow valleys do the latter open out into the district of the rivers' sources. Then the extensive, sun-bathed plateau country finally spreads out before the caravan and many of the members breathe more easily again.

The Indians themselves now know nothing of the time when their forefathers began to move down to the coast in summer; and little do they know of the meetings on the Lake Plateau in the olden days or the barter there, though some of the older people say they have heard of it.

The alteration in their migration habits is only one detail in a whole series of changes that have taken place among the Montagnais recently.

Some fragmentary notes on cultural changes.

Looking through the older literature on the Montagnais it is soon clear that their material culture has gradually undergone important changes though its main characteristics have remained the same.

Family hunting areas have disintegrated.

Among the nomadic hunters of forested regions it is usual to divide the country into 'spheres of interest' of which the exploitation is recognised as the right of a certain band of hunters, generally a 'great-family'. In such a division it is taken for granted that these hunters have the sole right of hunting and trapping there as well as of ownership of all booty. This custom, of course, implies a higher form of hunting culture than the primitive communism of the tundra people (cf. p. 674). There is in general a relation too between the faunal composition and the human institutions in the vast expanses of the north (878 a). Just because the natural conditions vary from the north towards the south in Newfoundland-Labrador, two different patterns of hunting are to be found: the communal hunting of the caribou in the tundra regions, and the segregated family activity in the forested area. (Cf. 177 a, 206, 207, 866, 868, 872, 878 a, 879, 895 b).

I was therefore extremely surprised to be told, by people who ought to know, that the Indian families of the present day ramble about the wilds according to their own impulses, without any old-established plan for the

division of the hunting-grounds among them. In proof of this I was informed that a Montagnais family who one summer visits North West River or Davis Inlet will quite likely turn up at the Gulf coast the following summer, and in spite of the doubts I expressed, my informers maintained that there was not and never had been any family control of land among the Montagnais Indians.

Their statements, however, quite probably hold good of the Naskaupee who, it may be said, live as a kind of parasite on the caribou. As this animal always moves against the wind, and as the prevailing wind changes considerably with the climatic periods (p. 310 sqqq.), it may well be that the Naskaupee in following their game come to quite other portages, swimming-fords, and hunting passes in one year than they do in another. CABOT (119) also stated regarding the Naskaupee: the number of lodges on the eastern side of the country depends on the movements of the caribou.

Caribou migrations can last several years; the herd will suddenly move to far distant parts for no known reason and this means difficult times for the Indians; hunger is always at the door, except in summer when fish is obtainable. Then the hunters try to track single caribou — a very uncertain prey; they must leave the smaller game they still have to the family in the camp and spread out farther inland with their cracky dogs. With tough endurance they struggle through the forest day after day, but hunger and hardships tell upon their strength, they gradually become exhausted and finally realise that they will never be able to return to the camp; nor does anyone ask why they do not return; their fate is understood by all without words (119).

It would thus be difficult to maintain any division of the land among the tundra Indians; it would simply collapse with the absence of the caribou. But among the forest Indians, too, calamity may break down existing customs. For instance, extensive forest fires may, in parts of Labrador as in the Siberian taiga, completely exterminate vegetable growth and then fur-bearing animals and all other game desert them (101); with them, of course, the Indians who lived there must also move away if they are not to starve. We have already had an example of this (p. 608). The great Saguenay forest fire in the early part of last century (434) must have been a calamity which forced the Indians to seek out quite new hunting-grounds further inland, or to try to win a livelihood on the coast. Forest fires may have been a contributory cause of the slow displacement of the Naskaupee and Montagnais in the wilderness (p. 401 sqqq.); they have certainly broken up the divisions of the hunting-grounds, and brought other great misfortunes.

Migrations of fur-bearing animals and other game in the woods can also bring the Indians face to face with starvation, e.g. the fox's period of circula-

tion in Labrador is 6—7 years (243). The migrations of the caribou can hit the Naskaupee quite hard, those of the fur-bearing animals the Montagnais. HIND reports such at St. Augustine. Then the families must move to quite new areas and perhaps never return to their own hunting-grounds (cf. 421).

The woods are generally the scene of distinctive individualism in the people's lives and, although circumstances can be quoted to prove the opposite, I am unwilling to renounce the idea that also in the Labrador taiga segregated family hunting existed, and that once the Indian had adjusted his equipment to the environment in those extensive family hunting-grounds he did not give them up so quickly.

Finally I received confirmation of my idea in the very exactly delimited great-family areas drawn for me by the Indians Pierre Gabriel and Mathieu André on my map. These are shown in Fig. 253. These two Indians said that there was a tacit agreement that in those areas trapping was forbidden to the hunters of any other family; the monopoly rights of hunting and trapping on such an area could be broken only if a stranger passed through it and was in need of food, he might then satisfy his immediate needs. Further they told me that the custom among the Montagnais was that on the death of the head of the great-family the area passed to the new head or the inheritor of his rights. — Later I found in CABOT's writings a corroborating statement [apparently it applies to Group 6]: most of the Indians are actually born upon hunting-lands handed down from their ancestors. At an early age each knows his own ground as the farmer's boy knows his father's farm (123). In another place CABOT stated even more definitely: the hunting-lands are held by individual (?) hunters, and are passed down from one generation to another by customs of inheritance similar to our own (cf. 879). Finally, to quote CABOT again: the hunting naturally descends upon some man of active age; if a daughter is married, the young husband may succeed to the lands. Parents, or even more distant relatives have, by common right, their place in the lodge. In fact, all must be taken care of in some way, in one lodge or another; about the hunters group the dependent ones, widows and orphans and incapacitated; none is denied his rights. This concerns particularly the Montagnais. Infringements upon each other's hunting-grounds are probably no more frequent, CABOT supposed, than the cutting of timber on another's land in civilization. Another remark of his is that the land is usually divided into three parts which are hunted in rotation year after year. — It is astonishing that I discovered exactly the same family tenure (now abandoned) of hunting-grounds among the Skolts-Lapps in Fennoscandia.

The above facts show that there was once a somewhat higher kind of social

organisation among the Montagnais of the Lake Plateau even as now among those of the south-west (cf. 868, 872, 873, 876, 877, 878 a, 879, 206 a etc.). It is only a pity that CABOT did not define more precisely the districts to which he refers.

It has earlier been explained that in the area between the Height of Land and the Gulf of St. Lawrence, which SPECK (879) labels the Laurentian region, the segregated family hunting type of the Montagnais prevails most characteristically. In it the authority of the chief is at its minimum and family self-management at its maximum. The family territory hunting system shades off into the band ownership of the caribou hunters, as may be expected ecologically, some groups even utilizing both methods under different circumstances (878 a). On the other hand, north of the Height of Land only communal hunting has been known. Now, from what has been stated above when considering the annual cycle we know there are, north of the east-westerly watershed, not only family hunting-grounds but also a gradual change from family to communal hunting (p. 588 sq.), and the same fact was reported long ago by SPECK (879) south of it. The varying seasonal ecological conditions compelled the hunter to adapt his activity to the supply of game, and that is why both methods have sometimes been in use by the same band.



Fig. 263. Indian youngsters of the Davis Inlet band. Photo the author, July 20th 1939.

In summer 1939 I met some older Seven Islands Montagnais and asked them about this matter. They said they knew the family hunting-ground principle but did not recognise the validity of any boundaries such as those of the areas claimed by the two Indians as described above. They said they could hunt within them whenever and to any extent they wished without any risk of punishment. The conclusion must therefore be drawn that the system had lost its authority on the Lake Plateau.

Thus the question of individual hunting-grounds in Newfoundland-Labrador to-day is vague. Though there are indications of the two examples of great-family hunting-grounds on the Lake Plateau, we have seen that this area was still in the hands of the Naskaupee in the middle of the 19th century, and they scarcely had separate hunting reserves in post-Columbian times. The conception of the segregated family grounds is consequently not very old and probably introduced when the Montagnais invaded the Lake Plateau. The Indian families south of Lake Melville still seem to have some such idea, but farther in the interior it is said that the majority of hunters do not respect any kind of family ground boundaries. It is of course true that the same hunters return year after year to the same area but this does not prevent other Indians even from great distances coming there to hunt.

Another argument in this connection is that the family hunting-ground question bears an intimate functional relation to the highly specialised economy arising from the fur trade which became important late in the 17th century (895 a) and is thus a post-European development (492 a). Many people may therefore think that the separate hunting-grounds arose in connection with the establishment of H. B. C. trading-posts on the Lake Plateau. SPECK (868) however has expressed the opinion that in other parts of America the family hunting territory system of the northern Algonkian was an aspect of aboriginal culture and also in Labrador (e.g. Lake Mistassini) he saw in it the marks of a deep stratum of circumpolar culture in one of its local phases. It is an undeniable fact that there the idea of family control cannot be traced to the sponsorship of the H. B. C. (878 a).

A further possibility is that in olden days the same arrangement was in force in Labrador (cf. 498, vol. 32) as among the hunters of boreo-arctic Fennoscandia: that the ownership of land was vested in the hunters collectively and not in individual families. However the right to use a certain area of forested land long ago became the monopoly of a great-family or a party of small families (cf. Fennia Vol. 49, no 4). Like other Jesuits LE JEUNE may have had the impression that the winter hunting of the Montagnais was more chaotic and unplanned than was actually the case (879); however, he noted (498, vol. 8) in the beginning of the 17th century that if these Indians became located they took their own hunting territory. It seems quite natural that a certain degree of permanency is necessary for a hunter to discover the character and resources of any given hunting district. I therefore fully agree with SPECK (879) that prior to white contact the dependence upon a migratory animal may have encouraged separate family use of territory. This would be precisely what we know from northern Fennoscandia. In this connection T. W. SCHMIDT's opinion (829 b, vol. I; 879) may also be quoted, that the family operated hunting territories are associated with an old phase of culture of the northern Algonkian hunters, which has been subjected to historical influences that have modified it, socially within and ecologically without, according to locality and ethnic background. The north eastern Algonkians tend to make the family, rather than the great-family the

carrier of land tenure principles, and where this has been lost or weakened SCHMIDT thinks it is due to non-Algonkian influence. Certain environmental and cultural conditions among the lowest hunters are conducive to such a system (879). Moreover, SPECK and EISELEY concur in the opinion of HALLOWELL that a number of the characteristics of the hunting territory system are extremely variable. A more intensive study of local faunal variations seems warranted, along with a survey of their effects upon the property arrangements of the band (829 b).

All these facts and opinions lead irresistibly to the conclusion that far-reaching changes have taken place during later times in the hunting life of the Montagnais of the Lake Plateau; the old social system has broken down. What is the cause? Has the yield of the area become too scanty for them, in spite of assurances to the contrary? This thought cannot be dismissed without further study if one looks at Fig. 253, which shows clearly how the trappers have slowly encroached upon the family district of Pierre Gabriel and Mathieu André. For every new party of young white trappers who march out into the wilderness, the limits of the supposed family areas must give way to supply land for new fur paths.

In general in North America, as DAVIDSON (206 a) pointed out, it is to be expected that the family ownership of districts will assume less and less importance in the economic system of the hunting nomads as a result of a progressiveness in natural poverty the more one approaches the barren grounds. In east Labrador the reason seems to be excessive exploitation of the hunting-grounds.

It has already been stated that the trappers are hampering the Indians in nearly all the large valleys and I have certainly received the impression that the former's areas are being constantly extended. They spread out like tentacles and drain out all the resources of what was once the Indians' land, for when the fur-bearing animals escape into the forests in unfavourable weather many of them fall into the white men's traps. A glance at the map, Fig. 253, will make this clear as regards the Lake Melville watercourses (of this more later). Corresponding conditions are seen in the configuration of the area covered by the Gulf coast trappers. The Indians of course regard this intrusion as an injustice, but they resign themselves to it as their fate, afraid of 'the law', and the law, as elsewhere in primitive conditions is dictated by the majority with the 'right of the strong'. In this way I can imagine that the old social structure of the Montagnais has been loosened and changed.

The breaking-up and disappearance of the social organisation mentioned above in conjunction with other circumstances seems to me to have made

Newfoundland-Labrador a region of deculturisation, degeneration in social respects for the Indians. This idea seems to have been vaguely present already to HIND: It is natural that a semi-civilised people when unable to live in security and driven into a less favourable milieu betake themselves to a ruder and more migratory life, and they are gradually reduced to a lower state of barbarism, he wrote.

CHARACTER OF THE CHANGES IN MATERIAL CULTURE.

Different kinds of stone objects, scrapers and such like, are still in use among the Indians, but the stone heads on their arrows and spears have been abandoned. Splinters still lie on the surface where tools have been made, the moss and grass have not yet grown over them. It can be said that the Montagnais emerged from the Stone Age only a few centuries ago.

Many generations of these primitive people have adapted their tools and hunting gear to the needs of their habitat, and in many cases not even the new inventions of the present day can replace them. Examples of such are the canoe, the tabanask, and snowshoes (204 c), all purely Indian inventions and in use among them from time immemorial. The Indian is very clever with his hands; with only his axe and his peculiar 'crooked knife', *mok'a'tau'kan,* he constructs his boats and sledges as well as his tools. In olden days the forests along the river banks yielded all the material necessary for the canoe: poplar for its ribs, birch bark for its outer covering, the roots of the juniper to sew the parts together and black spruce whence came the resin for the seams (181, 317). Nails were never used, the materials were fastened together, both in canoes and sledges, either with threadlike roots or caribou sinews (as earlier among the Skolts in north Finland); in that way they became elastic. Great pains are needed for this work; both canoe and sledge are subjected to great strain; the former must be able to take a load of 450 to 500 lbs, not including the two paddlers. The Montagnais' birch bark canoe was exceedingly light and graceful; a man carried it easily on his shoulders overland, and it sank only five or six inches in the water. Their length must not exceed three fathoms owing to the very curving brooks and the mountainous character of the country. Lately the birch-bark has been replaced by painted sail-cloth (317), and this is a practical change as the latter is more easily repaired. In our district the Montagnais gave up the birch-bark canoe, *wueskivi-ush,* nearly a century ago. Old white trappers at Lake Melville however remember the time when the Indians of that neighbourhood used birch-bark canoes lined with caribou skin.

The *tabanask* (cf. p. 619) seems to have undergone little change. The snow-shoes (204 c) are still of the type of olden times; they are very broad and much shorter than those of the western Indians (e.g. 19 × 33 in).

The *tepee* (1008), the sharply conical tent covered with caribou skin over which was laid a birch-bark cover, was still in use among the Montagnais only about forty years ago. The *meetchwop* [= shelter], the dome-shaped lodge, is to be seen to-day; in winter it is covered with caribou-skin on which snow is piled. A half-tent or wind-screen of birch- or spruce-bark has also been seen. On the other hand the two-fire wigwam is unknown among them (cf. however p. 655).

There was formerly no stove in the tent, only a stone hearth was built in the middle and on it a fire was made; even after the embers had lost their glow the stones retained their heat and kept the air warm until far into the night. Since the coming of the white trappers the Indians have learned for more than half a century to use calico instead of skin and birch-bark — Fig. 262 —. When the cloth-tent is well stretched it is as watertight as a skin one, and much handier to transport; as a wigwam, too, it is just as comfortable. The sheet-iron stoves are also copied from the whites; they are about a foot square at the end and 2 feet long; Fig. 262. This was a most important acquisition as it enables the Indian to camp almost anywhere, even outside the forest if necessary, because twigs and pine cones are good enough as fuel for it. A quite warm and cosy *meetchwop* can rapidly be set up. One makes a half-oval framework — a cage one might say — of bent willows (reminding one of the kuatt-framework of the nomadic Lapps) and on this is laid the sledge covers, the tent-cloth, and caribou skins. Two logs form the threshold to prevent the snow driving in. The floor is covered with branches of balsam spruce and in the middle are placed two iron stoves which are soon glowing hot and not only spread warmth but give light. The baggage, sleeping things etc. are set up against the sides to keep out the draught. These new articles have clearly been a great advantage in camping.

Certain other Indian inventions are still retained unchanged. The s u d a-t o r y b a t h (539) is still in use to-day; a favourite pastime or 'medicine' frequently resorted to. It does not take long to build a bath-house. At almost every portage and old camping-place Hind saw, when ascending the Moisie River, the stones which had been used by the Indians in preparing a vapour bath; and Bryant found all along the Hamilton River a number of curious wicker frames, on the same principle as that used for a meetchwop, which the natives had used in bathing. When in use the framework is covered

with caribouskins and placed over a hole in the ground, into which a number of large heated stones are rolled; the bather then goes inside and water is thrown on the stones, creating intensely hot vapour; (I found the same kind of bathing-lodge in use in Russian Lapland). When the vapour-bath was taken for curative purposes the Indian 'patient' might remain in it for hours and then plunge direct into a near-by lake or river.

It is the favourite remedy for sickness cherished by all the ramifications of the great Cree nation, and has played an important part in their ceremonies, too. The conjuror, sitting within the tent, frequently pretended to see the feeding haunts of the caribou or the winter lair of the bear, or the coming of the geese in the spring. According to LE JEUNE the Montagnais of his time had the utmost respect for their conjurors and were greatly afraid of them. The picture, Fig. 264 drawn by Mr WILLIAM HIND during his brother's ascent of the Moisie River (434) shows the Indian's vapour tabernacle and the credulous spectators squatting outside waiting for the message and accounts of the prophetic visions of the impostor.



Fig. 264. Montagnais Indians squatting outside the conjuror's vapour tabernacle. Drawing by WILLIAM HIND in 1860 (Cf. 434).

As far as my information goes no Montagnais in Newfoundland-Labrador has erected a fixed dwelling-place, of wood or anything else; and this is indeed surprising in view of the presence in the country of the white trappers' numerous blockhouses, the so-called 'tilts'.

In 1676, PATER ALBANEL relates, the Montagnais were entirely clothed in caribou skins. They did not understand the use of firearms but were very skilful with the bow and arrow. From CARTWRIGHT's writings one understands skin was the only clothing of the Indians from head to foot. On the other hand HIND noted in the 1860's that when they came to the coast the thin wild-looking Indians threw off their caribou-skin coats and leggings and were dressed in second-hand suits of European make. They then had a dirty half-civilized look, the agreeable wild air of forest children which they once possessed had disappeared, they became a half-civilized dandy shorn of his natural grace and dignity. Nowadays, as has been said before, their dress is usually composed of the ready-made clothes sold at the trading-store. Old Montagnais

at North West River said they certainly had seen Naskaupee in national costume but never anything of the kind in their own circles, not even the long chief's coat shown in Fig. 288.

Moccasins never seem to go out of use.

In hunting the gun superseded the bow and arrow as early as the 17th century. But still to-day, when the Montagnais runs short of ammunition, he uses the long-bow, a four-sided bow as tall as a man and arrows thick and blunted at the end so as not to injure the fur of the hunted animal, e.g. the musk-rat. Even in hunting the caribou the bow is sometimes used and a metal point of 15 cm is then fixed on to the arrow; this point was formerly of stone, sometimes rock crystal, and was also fixed on to a spear. The unbarbed stone arrow head broke off in the wound and worked its way on into the deer. The bone point on the other hand was securely attached. The three-feet-long arrow, spoken of by CARTWRIGHT, I did not manage to trace.

Pipes of stone, probably soapstone, *calumet*, are said to be still in use by the Davis Inlet band.

My observations regarding these matters were by no means systematic. Yet the impression has remained with me that in spite of great changes in the equipment of the Montagnais the main characteristics of their ancient culture as a whole are still there; the changes are mostly in details and have certainly been of practical use in their hunting life.

MUCH OF THE ORIGINAL NON-MATERIAL CULTURE STILL REMAINS.

It is of course impossible for a stranger to penetrate the recesses of the thought life of the Indian in a few improvised conversations, or to approach the secret chambers of the soul of a child of nature. Yet I have obtained some information from persons who have known the Montagnais since childhood which supplement and illuminate the account given here.

As has already been said the Montagnais are still pure hunters and fishers; agriculture is unknown and the amount of plants (berries) gathered is insignificant. However, many changes have undoubtedly taken place during the two centuries of merely peaceful contact with European civilization; they have lost a lot of their old customs and beliefs (514); yet one must be careful not to over-estimate the depth of the metamorphosis of their psyche due to Christian culture.

In 1636 GABRIEL SAGARD represented the Montagnais as the lowest order of the Indian races then known (435). In 1660 the Jesuit missionary, MENARD, spoke of the Indian neophytes of Seven Islands. In the 1780's we read in CART-

WRIGHT's work: the Montagnais profess the Roman religion but know no more of it than merely to repeat a prayer or two. At the beginning of the 19th century all the Montagnais are said to have been baptized, whereas many Naskaupi were still pagans (421). However, in 1860 HIND spoke of »the half-savage Montagnais and wholly savage Naskaupees» with whom he came in contact, »and a man does not get rid of his heathen notions by being touched with a drop of Manitou [holy] water». »Whether these Christian children of the forest», he continues, »have a real knowledge of sin and redemption, and of the world to come is doubtful. Have they indeed overcome the dread of the malice of the evil spirits, or do they still endeavour to appease them with offerings?» Many people still ask themselves this question when they meet the Indians, and generally the answer is uncertain (177, 869) — Regarding the Roman Catholic mission work see (130, 191, 198, 226, 250, 251, 454, 496, 498, 569, 793, 809, 904, 944, 1080, 1127).

All the Montagnais are nominally Roman Catholics, stated BRYANT, but, as the ministrations of the priest extend over a period of only one or a few days every year, there is time in the long interval without his care for the precepts of the church to be forgotten. WALLACE (995) observed in the beginning of our century how his Indian servant Pete offered sacrifice to the Manitou; when caribou was killed some bone, usually a shoulder-blade, was hung in a tree as an offering to the caribou spirit that he might not interfere with future hunts and drive the animals away. Certainly the Indian's keenest response is still to the inherited traditions and conceptions which land and water and the shadows of animals gave their ancestors thousands of years ago. In the forests he is still driven forward in haste by quite other impulses and another notion world than that of the Christian Church, it is said. In the interior the conjurors are reported still to have much influence over their followers. The authority of this savage hierarchy is said to be rather strong, and the old incantations and prophecies are still practised in the forest wilds as on the barren grounds. The Indians of the far north of Labrador especially showed but little evidence of contact with white men (995). Another thing is that a careful Indian reinsures himself in the Christian religion. The Catholic religious ceremonies must appeal forcibly to his eye and his imagination, and tend to awaken sympathies in the hearts of uncultivated natures naturally prone to the grossest superstition and ever willing to believe in superior influences visibly represented — wrote HIND.

The Roman Catholic Indian Mission in Newfoundland-Labrador during a period which will soon be a century (435) seems to be strictly confined to the two Hudson's Bay Company's trading posts, North West River and Davis Inlet, where there are small chapels. The missionary remains with his wandering flock a day or two. The religious ceremonies are strictly performed

during that time: mass is celebrated in Latin in the chapel, confessions are said to be made, marriages celebrated, burial services read and baptism administered, etc., until the priest starts for the other trading-post. After that the Indians disperse and do not see the missionary again until the following year (cf. Pater Babel's report reprinted in 435). The devotion of the Indian congregation in the little wooden chapel in North West River gave me the impression of deep sincerity; they seemed to me to exhibit the whole zealous faith of the Catholics. The priest there was also to pray for the sick, bless their guns, and collect money for this magic.

When later I met the Montagnais several times in the forests, far from the priest's watchful eye, they quite openly revealed many purely pagan instincts. It is quite certain that the drum is not only a musical instrument for them, but is also used in magic; e.g. to find out in which direction the game should be sought: some object is placed upon the drum and they watch to see in which direction it moves when the instrument is beaten, said the old chief Atvon; Fig. 255. Scapulimancy is used with the same aim; Sine Pest was pointed out as an expert among the Mishikamau band when they revolved a shoulder-blade to find out where the game was at the moment. The Montagnais, like the Davis Inlet Indians, were blindly convinced of the infallibility of scapulimancy.

The former also make no secret of their conviction that each animal is composed of a body and a spirit. Man must honour the spirit to have success in hunting. For example, to show his reverence for the spirit of the mink its skull is still always put up on a pole; if this is not done the spirit may be angered and the hunter fail in the chase. With the same object the caribou horns are placed on a scaffolding; if they were left on the ground and the dogs got a chance to gnaw them it might call forth the greatest misfortune for the band as the animal's spirit would drive the herd away from that part. Gnawed bones of the caribou, the beaver, porcupine, and bear are always thrown into the fire so that the dogs shall not get them and anger their spirits. There was a singular observance whenever a bear was killed and brought into camp. No young children or girls or young married women who had not yet become mothers were permitted to remain in the lodge, either during the cooking of the bear or during the subsequent feast. Bear flesh was only allowed to be eaten by adult males and mothers (435). — This is an interesting custom amongst the aborigines all along the circumpolar outskirts of the forest belt (393, 420) up to Lapland where the ceremonies are said to have been performed as late as a century ago among the Skolts.

The Montagnais also believe that there is a living spirit in plants and

other objects and the hunter must avoid anything that might provoke them.

Illness is brought about by malicious spirits who have taken up their abode within the sick person and must be driven out in secret by incantations.

Numerous terrifying spirits still range the forests, *'Man of the Woods'*, *'Winnebago'*, or *'Windigo'*, the giant cannibal, twenty or thirty feet tall, who lives on human flesh they think, and there are others. In winter such beings are less dangerous, for their tracks in the snow reveal their whereabouts so that people can be careful and keep the fire in the tent burning; then they do not dare to approach the camp.

When hunting has been good the Montagnais arrange a *magushan:* apparently a ritual feast in honour of the beasts' spirits. Then the drums are beaten, a ring is trampled out in the snow, the people take hold of each other from behind either by the waist or the shoulders and then the tribe begin to tramp hard in the ring, both men and women losing themselves body and soul in primitive joy. The drums continue without a break and the dancers may go on until dawn. I have been unable to discover what is really intended by this dancing, and my informers either could not or would not tell me. As a matter of fact all Labrador Indians seem to use the drums a great deal; sometimes the drums are brought out in North West River immediately the priest has departed, though more seldom there, said the Indians, for they do not like the white people streaming out to their camp during this performance.

Left for well or ill to the caprices of life in the wilds it is no wonder that the Indians fall victim to superstition. Dominating mountains they endow with supernatural attributes; when passing near one on no account can they be persuaded to point or refer to it, believing that such ill conduct will be the inevitable forerunner of stormy weather and misfortune. Such a taboo mountain is, according to Bryant, the Pootakabooshau, ten miles north from Lake Melville, which dominates the entire surrounding country at Mulligan. Grand Falls they refuse to approach; there is a superstitious dread of it among them, they believe the place to be the haunt of evil spirits, and assert that death will soon overtake the venturesome mortal who dares to look upon the mysterious cataract. Bryant stated that it would be out of the question to look for aid in this quarter amongst the roaming flock of the Indians. There runs a tale among the Indians that many years ago two of their maidens, gathering firewood near the Falls were enticed to the brink and drawn over by the evil spirit of the place. During the long years since then, these unfortunates have been condemned to dwell beneath the fall and forced to toil daily dressing deer-skins; until now, no longer young and beautiful, they can be seen betimes

through the mist, thrusting their white hair behind them and stretching out shrivelled arms towards any mortal who ventures to visit the confines of their mystic dwelling-place (cf. 105).

And to this very day the spirits seem to have unlimited control over the Montagnais' life in the forests, surmise those who know in North West River.

The reader is further referred to the descriptions by LE JEUNE (496), CARTWRIGHT (134), HIND (435), SPECK (877) and others of both early and late times concerning superstition among the Montagnais. In these a striking resemblance is to be found not only to the superstitious beliefs of the Labrador Eskimo but also to the ideas of the nomad hunters of north-west Eurasia a century ago (burial methods, significance of the back door of the tent, bear cult etc.). The similarities have not extended to the material culture.

This complex of superstition is however the basis of many of the most beautiful sides of the Indians' ethical culture. For instance the ancestral rules of mutual assistance are still fully valid and are one of the most interesting traits of this primitive society. When the conventional signs calling for help are seen near the trail by any passer-by, he rushes to the tent of the sufferer and gives emergency help even if it is for his most hated enemy. If he did not do this — i.e. intentionally disregarded the sign — he would be unsuccessful in his hunting and the following morning the 'Man of the North' might order his wind to cover the game tracks with snow (cf. LIPS' elucidating study in 580).

It is interesting to find that chieftainship — *vuitstamau* — still survives among the Montagnais; but the power of the chief does not extend beyond the local band within which it seems to be inherited. On Fig. 254 we have the Mishikamau chief in 1937, Atvon (Pest), farthest to the right, and his son, the present chief, Panace (Pest), farthest to the left; cf. Fig. 267. The chief exercises his right *de facto* but has no special nomination by the governmental authorities. Among the Montagnais his great task is in representing the regulating will of the band. One of his prerogatives where the office is invested with authority in social and economic concerns is that decisions in respect to hunting locations of families and individuals are referred to him (879). Much discussion precedes the great hunts; no one may remain with the women in the tent, it might mean failure in hunting; the discussions are unending. The drums beat in the monotonous rhythm which rouses their primitive instincts, and the wise men try to see how to arrange things by studying the blackened shoulder-blade. Then it is the chief who puts an end to it all by deciding and giving orders. Now many formalities must be observed; hunting is not merely a way of

obtaining food, it is part of a cult. To bungle at it is regarded by the Indians in the same way as creating a scandal in our social gatherings, whereas a skilful hunter is honoured among the Montagnais as a great warrior used to be among the southern Indians. There are still many rites and directions to be observed before the hunting can start and these are the duty of the chief. Ravens, wolves and dogs may not be killed, nor may a bear be shot unless in self-defence; clearly they fear that the spirit of this king of the forests will take revenge.

Conclusions.

In speaking of the progress or decline of a people it is always in relation to something else, and that something should, if possible, be taken from the milieu, from the natural surroundings and from the neighbouring people who are leading about the same kind of life; never should such a question be judged *in abstracto*, or else it is one's own taste which becomes the standard.

If we now remember the metamorphosis of the Labrador Eskimoes described above (p. 528) and compare with it the changes in the Montagnais society, the progress of the former and the backwardness of the latter is clearly apparent.

The Montagnais have been unable to develop at the same pace as their nearest neighbours, the Eskimo. The whole life of the former is dictated by the hunt, he dreams of nothing but the game and their spirits; here are his greatest achievements. Hunting elicits a special talent and personal skill; the sole ambition of the Indian is to be as perfect a hunter as possible, and this becomes routine in his life. Because of his geographical position and his mental stage he seldom comes into contact with the rest of the world, and no representative of modern civilization has helped him to break out of the charmed circle of prejudice and tradition in which he lives. It has already been said that I failed to find out that any Indian in Newfoundland-Labrador could read or write or count, whereas the Dominion Governor, MacGregor, writing nearly half a century ago stated that every Eskimo child above the age of seven could do all three. This explains why there has been no development of the Indian national consciousness.

If we think of the enthusiasm of the Eskimoes in learning the Christian morals and the vital interest they take in the advantages in daily life obtainable through the Europeanized culture we must ask ourselves: what have the representatives of Christian culture given to the Eskimo and what to the Indian? To an outsider it must appear that while the Moravian Missionaries have *de facto* excellently solved the delicate problem of the spiritual peace, the civilizing and the development of the competitive capabilities of the

Eskimo, the results of the Catholic Missionaries' activities in these matters among the Indians in Newfoundland-Labrador have been poor; they have never been able to create the atmosphere necessary for development.

Lips (580) in his study of public opinion and mutual assistance among the Montagnais-Naskaupee came to the conclusion that the unwritten constitution of the Indians is by no means rigid, but regulated for instance by changing economic conditions. As a result of the dealings with the Hudson's Bay Company entirely new and definite rules have developed, have been sanctioned by Indian public opinion and embodied in a new law, 'merchant law, and law of contracts'. Under devoted conscientious leadership perhaps the Montagnais could also be raised to a higher plane of spiritual and material culture.

Eighty years ago Chisholm, after living for forty years in contact with the Montagnais (434) described them as honest, hospitable and benevolent. But they lived with much superstition, he stated, which can never be erased from their minds for want of education. These words are fully applicable at the present day. There is no doubt also much truth in Hind's statement: Indian customs never change; they are like the Indians themselves; and he adds: they will all go to the grave unchanged as long as they remain heathens.

The only people who seem to have any deeper interest in these children of nature appear to be the managers at the H. B. C. stations. And I believe the more progressive Indians would themselves recognize their great indebtedness to them. Perhaps this should be explained in a few words.

European civilisation began to penetrate to the Montagnais as early as the 17th century, at first like small streams (coureurs des bois), later as a mighty torrent (Hudson's Bay Company's fur trade and other fur firms). It was the fur trade that opened up the peninsula to the trader and the missionary, and with them a new historical phase for the free sons of the wilderness: their economic freedom gradually disappeared.

Several stages can be noted in this trade; all are dominated by the same principle: the exchange of the Indians' furs for the goods of the whites, chiefly weapons, ammunition, tobacco, molasses and all kinds of fancy articles and small trash. These last especially attracted the Indian; if in the humour to barter he might give his last skin in exchange for mere rubbishy things or tobacco and molasses. The consequence was that when it came to the obtaining of his winter stocks he was quite without anything to exchange and the station had to supply him on credit. The habits of the natives have altered little with time; they are still like children in yet another matter; they treat their debts with great nonchalançe. According to old custom the debts of a hunter

were cancelled by his death. It was therefore necessary for the trader to have a credit contract with him if business was to be stabilized; this needed guarantors and they were usually the managers of the Hudson's Bay Company's posts; in this way the Indian was prevented from making use of credit in one place and exchanging his furs in another. This custom developed and resulted in the clever managers gradually having all the Indians in his hand. SKINNER alleged that the Hudson's Bay Company had aimed at persuading, for example, the East Crees to spread farther and farther to the north and west to exploit the fur resources there: it seemed to him fairly impossible that the game resources were sufficient for the Cree and they were thus obliged to obtain their food from the Hudson's Bay Company and give them furs in exchange; it was apparently therefore only recently that they had migrated to that part of the peninsula. Af first it seems perhaps improbable that a trading company should be able to control and direct the lives of the Indians in the limitless wilds; yet we have already seen the same phenomena in the east of the peninsula in more recent times (p. 581 sq.); the Hudson's Bay Company directing the Naskaupee now to the north, now to the south as they considered best.

This policy has come to mean that the exploitation of the hunting-grounds is in many respects regulated by the fur trader; in the district under discussion the Hudson's Bay Company. With some exaggeration it may be said that in this way the Indian hunter is becoming only a kind of intelligent hunting-dog for the trader, kept alive by him to bring him skins. But I wish specially to state that as far as I could discover the company has on the whole acted in a manner absolutely humane. It must be remenbered that they take great risks in giving the Indians credit, not least the managers personally (811).

For the Indians' civilisation, the development of their mentality and talents, the Hudson's Bay Company has naturally not had any interest. On the contrary it was a necessity of the fur trade to disperse the Indian families among the creeks and rivers (492 a), and since this began everything possible had to be done to keep the Indian a nomad. As a good trader the Company therefore also opposed the desire of the Jesuits to concentrate the people in permanent settlements and introduce agriculture, etc. (868).

There is something to be deeply deplored in the fact that these children of the wilderness are compelled by the white man to extract a scanty living from the woods in the same way as their ancestors, for the Indians are undoubtedly in danger of being ruined in the trapping country nowadays occupied by the pale-faces.

The silent struggle for the hunting grounds.

Life in the wilds trains the judgment and produces generally a good and noble human type. Nearly every day the trapper is reminded of his own littleness, conditional existence, and subordinate position in creation, so he becomes humble and helpful towards his equals, and in return seeks protection from his neighbour when matters become precarious. He learns to love his neighbour almost as himself, and therefore the white trapper has sympathy for the Indians. Most of the trappers speak the Montagnais' language fluently from childhood. In the woods they are in intimate contact with the Indians. They thus know each other. Meanwhile people accustomed to European thought processes cannot help being surprised when they hear the trappers express the most vivid sympathy for their competitors, the Indians. Although the latter have given them unpleasant experiences in the disappearance of clothes or food from their tilts, the trappers seem to resign themselves easily to such happenings and enmity rarely arises, at least not a permanent one. This seems to be chiefly due to the fact that the trappers who are mostly Anglo-Saxon and very religious have realised that the Indians' ethics and conception of life and its demands are quite different from their own, but at any rate have their good sides. They generally accept the Indians in a brotherly fashion, gladly share with them their small surplus, often to the despair of their wives when they lightheartedly give away household utensils and other home necessaries which cannot be fetched from the shop just because the Indians need them. Many of the trappers even admire the natives (cf. p. 604). The Indian on his side looks upon the trapper as his big brother; disputes occur but again due chiefly to the difference of ideas as to what is right and fair. On the whole the intercourse of the two races is marked by sincere and conscious friendship. This is the background which makes so deeply tragic the silent drama now being played out in Newfoundland-Labrador.

Now as to the conclusions to be drawn from the map, Fig. 253. It is clear from this that the Montagnais are to-day being driven by the white trappers from those forest valleys which are most rich in fur-bearing animals, and just those hunting-grounds where their forefathers roamed. Moreover the white man's area is rapidly and *progressively* increasing, the map shows how his tentacles spread deeper and wider over the country. Of course the Indians may still hunt there but it is gradually becoming harder to make a living at it and the unhindered development of this state of things is clear.

The Mealy Mts district is now closed in by the Rigolet trappers from the north, the Dove Brook trappers from the south-east and the North West River trappers from the north-west and west; the last two groups will soon completely surround it in the south-west and then tighten the ring round the bare spots on the Mealy Mts. Here the game will dwindle and the Indians be compelled to abandon the area.

Looking at the Indians' country round the sources of the Rivers Susan and Beaver and further away to Mishikamau Lake we see how the Hamilton River trappers have already closed it in from the east, south and west, and the Naskaupee River trappers from the north-east. As the trappers have also taken possession of land east of Mishikamau Lake the future development is apparent: in a few years the ring will be closed in the north and then the contraction begins; the Indians will be forced gradually to abandon this area too.

A similar fate seems to be in store for the Indian district lying between those of the trappers from Rigolet, the Naskaupee River and Hopedale; there the white man's trapping-grounds are pushing in wedges from other parts of the coast although in the absence of sufficient information they could not be shown on the map.

Here we have had some instructive up to date examples.

The map also shows how the trappers who have fur paths farthest to the west, the so-called *'Height-of-Landers'*, have begun to penetrate the Indians' last great-family areas in the Hamilton River basin, and they have to some extent broken them up. In this process I should like to see strong support for my idea that the Indians' wanderings during the hunting season round the basin of the Lake Melville water system (p. 637) — mostly a few families in company — is due to the fact that an earlier, higher social order has been disintegrated in consequence of the white trappers' invasion of the Indians' great-family areas in the forest valleys; the people in this way lost their roots and it was easy to expel them from their inherited trapping grounds.

This development is slow, but the final result on the Lake Plateau can be imagined as resembling that now to be seen in the south-east of the peninsula, south-east of the Paradise River and east of the Eskimo River. The map shows no Indian migration traces in that sector, and it is not surprising. The Indians come regularly to the mouth of the Augustine River but never farther than a river mouth about fifty miles west of Forteau Bay. The trappers of that part certainly say that sometimes the Indians come to the forest valleys there; in Chateau Bay one trapper told me it happened sometimes that up in

those valleys the white men's winter stores vanished from the caches (p. 611). But in any case the Indians no longer regularly visit this end of the country.

It was stated above that the occupation of the trapping-grounds by the whites is progressively developing to the disadvantage of the Indians. Perhaps this demands some more explanation.

The fact must not be disregarded that the Montagnais' material culture, like their social structure, is undergoing transformation through their contact with the whites. They do not lack adaptation capacity (cf. the Davis Inlet Indians) even if they have not gone the length of building fixed dwellings at their chief stopping-places. Yet it has just been stated (p. 646 sq.) that the Montagnais have at bottom lagged far behind in the general development of those parts (cf. 916). So long as there was sufficient game and fur-bearing animals there was of course no need for the Indians to alter their habits and their relations to their surroundings; their daily needs demanded no further development of their material culture; the Indian hunter had already reached the climax of that stage. But the forests' resources have changed for the worse and the Indians' position with them. When the fur trade was organized and the trapping equipment — traps and guns — improved, the stock of fur animals and other game became more exploited than the barrenness of the country could bear. The Montagnais were pressed back to the thinner forests.

The white man's providence and better organisation have given them further advantages over the Indians.

We shall see later (p. 704 sqq.) how systematically the white trappers prepare for and carry out their work. The whole matter is for many reasons different for the natives.

The Indian is always accompanied on his migrations by his family. He does not like to leave them alone in the wilds, though this happens only during collective caribou-hunting. As the Montagnais does not lay up stores of food he must supply his family by more or less continual hunting. During the trapping season he may suddenly be obliged to leave his traps and go after game. When that is done and he can again go to his traps he may find that beasts of prey have been at them and spoiled the valuable coats of the booty. Of course they know the habits of the animals and the strategy of the hunting as well as the whites (579), but the latter are so much better equipped in the matter of food, and can therefore regularly visit their traps. It may be added that year by year the percentage of fur animals caught by the white trappers increases while that of the Indians correspondingly diminishes. It has happened that the Indian, when this was brought to his notice, has in childish desper-

ation laid out his traps along the trappers' *fur paths* (644); but there is always trouble afterwards, at least temporarily, and it always ends with the Indian withdrawing to desolate parts off the beaten track which are poor in game There he can wander about with his tabanask undisturbed by the whites.

The difference between the ways of livelihood of the white trappers and the Indians is thus about the same as that between hunting and a hunter's life, CABOT has so aptly remarked. The white man's family stays in the warm, comfortable house in the village and suffers no lack of food in the absence of fathers and their sons; the Indian must drag his whole family and his wretched possessions with him on his trapping journeys which are often disappointing and unfruitful; most of them lead a dog's life most of the time and every spring starve to the edge of the impossible.

All this shows how deeply the trappers' activities have interfered with the life of the Indian hunter on Newfoundland-Labrador. Perhaps the trapper realizes it; perhaps that is what rouses his sympathy, and his helpfulness to the aborigine hunter may be unconsciously based upon it. The Indian, on the other hand, does not fully understand his situation yet; he continues his life as his ancestors did centuries ago. While the Moravian Missionaries have interested themselves in solving the problem of civilizing the Eskimoes and caring for the future of his possibilities of a livelihood in Labrador, the Catholic missionaries seem to have been quite indifferent to the Indian's subsistence and future life in this world; they seem to think that they have carried out their responsibilities for his weal or woe by dealing out some meagre alms. — (Cf. 315).

The future of the Montagnais Indians.

The question now arises, how is all this to end? The crisis has already continued several decades. CABOT noticed that the Montagnais had passed the Rubicon of children of nature: at the beginning of this century they were already in permanent dependence on their white neighbours; if they had suddenly to stop buying from the stores their lives in the spring would be very precarious. It is the same here as everywhere else on the earth: when the aborigines cannot or will not manage in the old ways with the natural resources at their disposal and have not yet risen to a higher stage of culture there is nothing but to continue their declining mode of living. In 1636 GABRIEL SAGARD stated that the Montagnais were the lowest of the Indians in the St. Lawrence area (434; cf p. 641). During the subsequent three hundred years they have not succeeded in raising themselves above the early hunting plane.

One thing seems quite clear: they are now, as they were formerly, hardly capable of adapting themselves to the white man's practice of living in permanent habitations.

The Indians are timid and they think the wilderness is limitless. The peaceful Indian hunters constantly give way to the whites until one fine day they will find themselves in the most distant and most inhospitable outskirts of the country, poor alike in fur animals and game. They can there live undisturbed as their forefathers did. Yet every new generation of trappers encroaches more upon them; it cannot be long before the white man has reached the Indian's last refuge. When this happens the latter's hunting life will be extinguished for ever in these parts (cf. 315).

Most observers consider this to be the course of development in Newfoundland-Labrador. For my part I do not think the matter is quite so simple. We have found (p. 608) that the Indians possess a not inconsiderable ability to adapt themselves to new natural conditions; we really know nothing of their ability to adapt themselves to new social conditions.

It is therefore too early to paint too darkly the future of these Indians; it may happen that great changes occur in the trappers' ways of living. A large sawmill is being planned in North West River. It may be that in a few years one of the greatest power stations in the world will start working at Grand Falls in the Hamilton River; then already a railway will connect the iron ore mines on the Lake Plateau with the North American network. Such events cannot but react upon the lives of the trapping communities. It is difficult to say how great will be the attraction for the younger generation of fur hunters of this great industrial development with its certain preference for white employees; and it is therefore impossible to make any responsible prophecy as to the future fate of the Montagnais.

— In August 1939 I had a conversation with one of North America's foremost experts in the sphere of fur animals' trapping. It then appeared unnecessary to be too pessimistic about its future in Newfoundland-Labrador. It is probable that the trappers in the east of Labrador will be compelled to give up the country to the Indians and take up others methods of earning their living as has already happened in many parts of Canada, by which means the natives have had every possibility of continuing their capture of the fur animals; they are more accustomed to the country than the whites. Then too experience in Canada has shown that Indians conform better than the whites to the regulations issued by the authorities for the purpose of

protecting certain fur animals and are there better able to hunt them systematically, said the expert (1082 a). He continued: it is probable that it will still be the Indians after five generations who are following a profitable trapping occupation in Labrador's endless wilds. And farther into the future than that we need not look.

Davis Inlet Indians.

This mixed group of Indians is named after the Hudson's Bay Company's station where they barter their furs. The nucleus of this band — cf. Fig. 252 — came from North West River originally as we know (p. 608), and it preserves in parts its linguistic and cultural particularities. Intermarriages and shifts of residence have tended to keep the band well mixed. The Davis Inlet people have thus later been much influenced by the Barren Ground band (cf. p. 672) with whom they have intermarried and associated for several generations, according to STRONG (909); formerly, when the caribou were abundant there, they often lived together on Indian House Lake. The description on page 667 sqq. of Barren Ground-Voicey's Bay band among the Naskaupee should also be compared here. Also between the Davis Inlet band and the Naskaupee of Chimo band there was much intercourse.

In this band the constancy of number of individuals is lacking which is distinctive of the others. In 1926 STRONG found it to consist of 36 persons. They mostly stayed in the interior and only now and then were seen at the trading station; Fig. 265. The census of 1935 shews 81 individuals of which 38 were married, 2 widows and 41 unmarried. In the middle of August 1939, when I met the band at Davis Inlet — Fig. 266 — and had a talk with their chief, Susapish or Joe Rich, — Fig. 267 — it comprised 107 persons. This rapid increase in population clearly shows that the part of the country where they move about has a special attraction for the Indians. Its composition was peculiar, for besides the predominating descendante of the Montagnais from the North West River group there were three Seven Islands men with their families (from the Mishikamau band) — Fig. 268 — and, surprising to relate, two Naskaupi from the Ungava or Chimo band — Fig. 269 — (one by marriage with a Naskaupee girl). Chief Susapish said he was sole ruler over them all.

WALLACE met with some of the Davis Inlet Indians in the middle of September 1905 at George River, at about 55° 20′ (995). The encampment consisted

of two deerskin wigwams. One was a large one and oblong in shape, the other of good size but round. The smaller tent was heated by a single fire in the centre, the larger one by three fires distributed at intervals down its length. Chief Torna occupied, with his family, the smallest lodge, while the others made their home in the larger one. WALLACE's party was discovered long before arriving and was met by the whole population, men, women, children, dogs and all. The reception of the picturesque group was tumultuous and cordial. The swarthy-faced (at least eleven) men, lean, sinewy and well-built,



Fig. 265. Hudson's Bay Company's trading post at Davis Inlet; looking north. Photo the author, Aug. 1939.

with their long, straight, black hair reaching to their shoulders, most of them hatless and wearing a red handkerchief banded cross the forehead, moccasined feet and vari-colored leggings, the women quaint and odd, squatty and fat, the eager-faced children, little hunting dogs and big wolf-like huskies.

These Indians still lived in the crude primordial fashion of their forefathers. They had not accustomed themselves to the use of flour, sugar etc., their food was almost wholly flesh, fish and berries. They had adopted shotguns, but the bow and arrow had still its place with them; the boys were very expert in its use. Some of these people had never seen the priest, WALLACE reports (995). Already then the Eskimo sledge had obtained an entrance among these Indians. From Atuknipi on George River there seemed to be a trail to Davis Inlet (995).

Nowadays, when the hunting period begins in August the Davis Inlet band divides into smaller groups of about twelve persons who move into the interior. Some go via Sango Bay, some via Adlatok Bay, and it is round the sources of the Adlatok River that the latter prefer to remain in the winter, though they sometimes go as far as Snegamok Lake. It also happens that they look in at Makkovik and Kipekak. Often the hunting goes even nowadays as far as the George River.

In the valleys running down to the Atlantic the hunters of this band also



Fig. 266. Part of the Davis Inlet band Indians' camp at Davis Inlet; looking south. Photo the author, Aug. 1939.

come upon areas where the Eskimoes have laid out traps, and this is a great trouble to them as it compels them to make their way farther into the country to find unoccupied land and thus avoid conflicts. Circumstances (place names in the islands; cf also p. 582) indicate that the Montagnais in Labrador formerly extended their trapping-grounds to the ocean shore, just like the Beothuks in Newfoundland in olden days. I was unable to find out how the Indians lived at that time; CARTWRIGHT alone gives some information on the subject; they seemed to have been in their canoes out to the most distant islands to collect eggs.

From what was to be heard at the trading-station of Davis Inlet it may be concluded that the hunters of this band are in general not very enterprising;

when they were starving they joined up with the Barren Ground or Voicey's Bay band (Naskaupee).

Their habits seem in no vital respects to differ from those of the other Montagnais; yet the caribou is their chief spoil and they prefer caribou meat to all the food of the whites.

The Naskaupee Indians.

While the Montagnais can be most expressively termed the taiga people, the wild men of the primeval woods, the woodsmen, the Naskaupi are the children of the sub-arctic tundra with its wooded valleys and the river landscape, and are therefore sometimes called 'the river-men'. Their life is made up of wandering in the tracks of the caribou. With an allusion to the Eskimo, the raw meat eaters (p. 454), the Naskaupee have also been called: 'the caribou eaters'.

The name Naskaupee is differently spelt by different writers: Escopics (CURTIS), Cuneskapi (PATER LAURE), Nasquapee (HIND), Nascopies (MCLEAN); here the spelling Naskaupee (SPECK) is used.

The origin and meaning of the denomination is not quite clear. FERLAND (252) says that the heaps of stones 9—10 ft high set up along the Gulf coast to serve as navigation marks or to indicate the position of dwellings used to be called naskaupees. Another explanation, however, is more probable. It is well known that many natives, especially of Indian stock, go under the name given them by their neighbours or their enemies and this has often an opprobrious meaning of which the bearers have no idea. The name Naskaupee, now generally accepted, seems to have begun as a term of abuse; an expression of the Montagnais' contempt for their wild northern brethren; some say it is equivalent to 'pagan', others that it indicates a 'false, unreliable creature', 'helplessly lost in poverty', 'whose mental gifts are so little developed that he even lacks the conception of individual property', or on the whole an ignoramus with a tinge of falseness. The Montagnais, alleges TURNER, are supposed to have given their former allies this name after they had acted traitorously towards them in a common feud against the Eskimoes of the east coast. HIND translates it as 'a people standing upright'. Their neighbours in the west call them simply *Msuhau-au-eo*, which means 'tundra people'.

The Naskaupee themselves will not pay any attention to this name; they call themselves Nenenot which has been translated as 'the real' or 'the ideal red man', or 'our own people'. They use the denomination naskaupee for an evil spirit which leads people astray in a snowstorm.

Some outstanding features.

I was prepared to find these Indians very primitive and I was not disappointed.

Already their outward appearance indicates poverty and primitiveness. Never before have I had so overpowering an impression that I stood face to face with people of the stone age, or perhaps even cave people; it was at the end of July 1937 at a camp of mixed Montagnais and Naskaupee beside Davis



Fig. 267. Susapish, the chief of the Davis Inlet band, with his family at Davis Inlet. Photo the author, July 1939.

Inlet. It was an attractive, selected party who had come to meet the Catholic priest: thin, supple men, Figs 270 and 271, with unbelievably long legs, slim women with flashing glances — Figs 272, 273, and 274 — and shy children — Fig. 275 — all appeared in their savage, primitive dirtiness; they are not nearly so clean as the Montagnais. Although it was the height of summer many of them were clothed in caribou-skin parkas, a bloused gown of caribou-skin with a hood, Fig. 275.

Their features were mostly hard, the glance searching and almost scornful when looking at a stranger; Fig. 276. Yet many of them had rather delicately formed features, small hands and feet, a large and rather soft eye inclined

towards the nose; the hair was intensely black, coarse and thick, the teeth regular and beautifully white (435); Figs 272, 273, 277, 278, 283 and 279.

At first they were rather shy and silent but that soon wore off and they laughed and talked gaily; the natural joyfulness of primitive people broke through; they shook hands in a most friendly way, laughed and joked and all talked at the same time. When they raised their voices the men spoke in a curious, flat-toned falsetto. The impression was one of surprising attractiveness in contrast to my first meeting with the mild, melancholy, but repulsive Montagnais. From the first moment it was clear that I was meeting a fragment of mankind who had to a great extent been preserved from the influence of Europeanizing culture.



Fig. 268. Montagnais of the Seven Islands band (note the embroidered cap) who has joined the Davis Inlet band at Davis Inlet. Photo the author, Aug. 1939.

The primitiveness of the Naskaupee is a natural consequence of their isolation from the influences of the civilized world.

I have found nothing in the literature regarding the work of missionaries among the Barren Ground Lake Naskaupee. During the time when the Montagnais were being already strongly influenced by the Jesuits the Naskaupee Indians were not at all known to the white. The Lake Plateau Indians certainly had no contact with these Roman Catholics before the beginning of the 18th century (LAURE, 1731). On the other hand, only lately have the northern Naskaupee been visited by a missionary. BABEL (27) was with them in 1866 and he is said to have been the first priest to travel from the St. Lawrence River to Ungava Bay. In 1877 the Indian missionary PÈRE LACASSE went to Ungava, but he had no success; he arrived just in a year when the hunting was very bad and the Indians starving, and the latter believed that the presence of this priest was the cause of the disasters. No one was converted. In 1905 the Rev. Samuel M. Stewart of the Church Missionary Society of England was at work at Fort Chimo (995). Today the southern Naskaupee at least are christianized.

Hudson's Bay Company's people in Fort Chimo and other trading-posts have probably had more opportunities of influencing the Indians than either mission-

aries or travelling investigators. But it has scarcely been in the interest of the fur trade to raise their level of existence; cf. p. 812. Mc Lean (610) after his long experience as manager at Fort Chimo said in 1849 that the Naskaupee were selfish and inhospitable in the extreme, they demanded payment for everything, but he adds — and that is interesting for us —: that this they must have learned from the white man as they were very generous to each other. Father Arnaud, who in 1854 passed a winter among the southern Naskaupee, reports that they were very good to each other; they liked to meet and help each other.

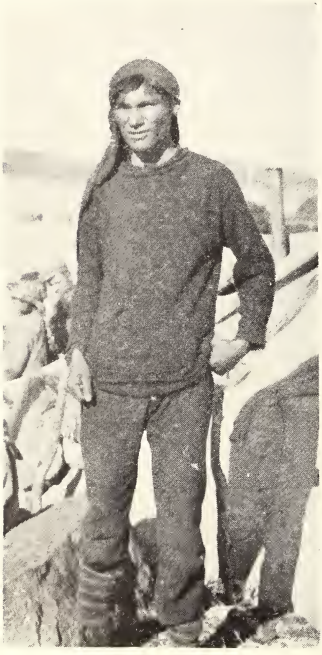


Fig. 269. Naskaupee of the Ungava band who has joined the Davis Inlet band at Davis Inlet. Photo the author, Aug. 1939.

There has been little intercourse with their easterly neighbours the Eskimo until quite lately; this may seem surprising when their districts are only separated by a comparatively low range of hills, but is probably due to century-old feuds, (p. 441 sqq.); much is related of them in their folk-lore. At the beginning of the 19th century Turner said the Eskimoes rarely ventured into the interior, unless along some of the great rivers falling into Ungava Bay. There, however, it sometimes happened that some Eskimoes camped beside some Indians. The old Indian men and women left behind with the children while the others were out on the winter-hunting were more than glad to have jolly Eskimoes so near from whose stores they could profit until the hosts themselves were quite destitute of food and moved away to a quieter place.

In any case not so few similarities can be observed to-day between the northerly Naskaupee and the Eskimo, both in the sphere of material and non-material culture (1002), and this must be traced to the cultural borrowings. The *ulo*, the woman's knife (*cagwi'igon*), is also used by the Naskaupee in tanning, this is no doubt a loan of late years (p. 529).

The old life customs, clothing, tools and dwellings then remained until recently among these Indians.

When Cabot visited these people at the beginning of the current century their clothing in winter — and apparently all the year round for some of them — was of caribou-skin, the hair inside, and the outside of the finely-dressed chamois-like skin decorated with various designs in colour: blue, red and yellow. Following tradition they wore an under-shirt of the silky skin of unborn caribou, and over this was a parka. Moccasins and leggings of the same

caribou-skin were worn on their bare flesh. The beautiful chief's coats of white shamoyed caribou-skin, with quasi-magical (?) ornamentation in red and blue painting were masterpieces of primitive art; Fig. 288. When the garment had a hood it was sometimes the skin of a wolf's head, with the ears standing up and the hair outside, giving the wearer a startling and ferocious appearance. Tight-fitting deerskin or red cloth leggings decorated with heads, and deerskin moccasins completed the costume (995). Also the woman's dressing of the same materials was most skilful; cf. Fig. 289.

Cabot says that among the south-eastern Naskaupee the wearing of trousers only began about the beginning of this century, when many of them wore them under their leggings. But he alleges that the people of the George River still preferred the old way. Sleeping-bags were generally made of caribou-skin and their covers of hare skins. But even then the George River people were beginning to abandon their national dress; their taste of olden times had deteriorated.

Their artistic sense of bygone days has now disappeared or at least is not to be compared with that of the Eskimoes. One can see moccassins neatly ornamented with coloured beads or porcupine quills worked with silk into flower designs, and caps embroidered with glass beads, but that is all. Nowadays it seems that ready-made clothes have got the upper hand, at least in summer-time. Many of the men I saw had a kind of sports cap on their heads, whereas formerly they wore no hat, only pulled the hood over the head. This hood is similar in shape to the Eskimo's kulitak.

Measured by economic and social standards the Naskaupi must be considered among the most primitive peoples of the earth. But this opinion must not be regarded as a disparaging one in their own environment, for in the god-forsaken regions where they live an unusually high degree of buoyancy and inventiveness is demanded even to keep alive, and these qualities they certainly possess. The isolation from contact with the white people and the conditions of nature under which they live, have evidently been contributory causes of the retention of their primitiveness which, as we shall see (p. 697), once resulted from a process of deculturisation.

It might be thought that the race could be kept pure in the wilds where the Naskaupee live. Yet they are not so unmixed as their appearance may indicate at first glance. According to Waugh's notes the original Naskaupi element should be a mere remnant now. His list of names showed twelve men

who could be considered Naskaupee, the remainder, four, being Montagnais. A number of the women also were Montagnais. The language spoken showed, I believe, WAUGH continues, some confusion with Montagnais. Two at least of the Ungava additions to the band showed unmistakable signs of Eskimo admixture; one of these men spoke Eskimo quite well. Some of those who visit Davis Inlet are known with certainty to be mixed with the Montagnais. Three or four families are descended from half-castes (RICH, cf. Fig. 267), but

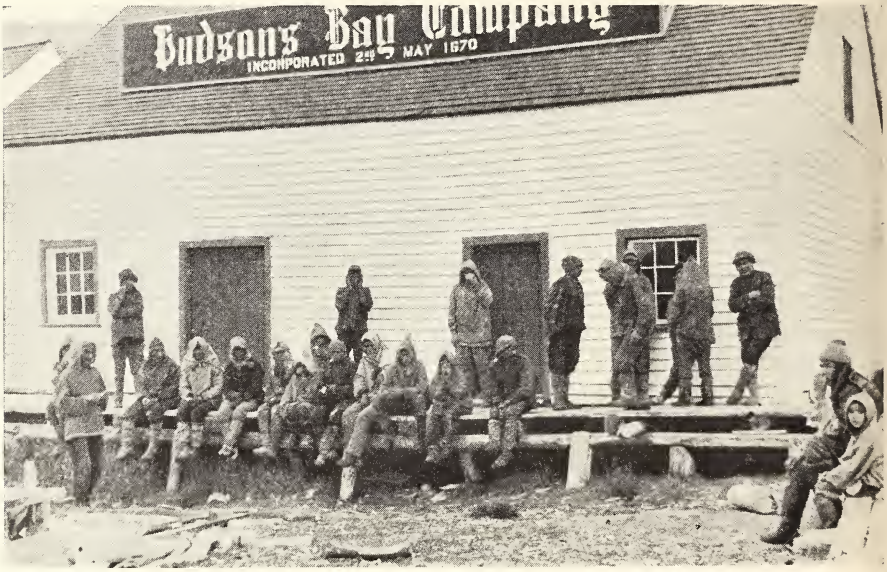


Fig. 270. Naskaupee and Montagnais of the Davis Inlet band waiting for their priest at Davis Inlet. The hood is drawn because of the plague of mosquitoes. Photo the author, July 1937.

in the third generation they are completely Indian both in speech and habit; some of them can speak a little English but this does not conceal their Indian type.

As far as my information goes these Indians and Eskimoes intermarry, but this may be rare in spite of the tolerance prevailing to-day (cf. p. 443 sq.). Only in a few cases have I found that an Indian has taken an Innuk to wife, but never an Eskimo a squaw. Yet among the Voicey's Bay band there is at present an Indian with Eskimo blood, and many of the others can speak the Eskimo language. It has happened that Naskaupee, especially children, have stayed for a time in an Eskimo camp, but they have never been assimilated and have returned to their people.

The Naskaupee's health conditions seemed to leave nothing to be desired, Fig. 284. They keep to their traditional domain and thereby avoid contagion by the epidemics which now and again circulate along the coast. The Naskaupee are still said to be hardier than the Montagnais. They bear cold as well as the Eskimo. The little children show astonishing indifference to temperature; they sometimes run barefoot in the worst cold. The birth rate is said to be good and the natural increase of numbers is satisfactory; the children are brought to birth as easily as the young of wild animals. However, they could not avoid the diseases completely. For instance in 1919 they suffered much from smallpox and even scurvy due to want of fresh meat. It is these epidemics and the awful starvation which has reduced the population (cf. p. 592 sq.).



Fig. 271. Naskaupee Indians at Davis Inlet. Photo E. H. KRANCK, July 1937.

These Indians, of course, know nothing of what we call hygiene; the wilderness requires nothing for the health but food and clothing. They scarcely ever wash themselves unless sometimes the face; the mosquitoes bite and the cold stings worse when the face has been freed from its natural fatty secretion. Instead they use the vapour bath frequently, they really love it. It seems to be not unusual that when all arrangements for a move have been made after long discussions, the head of the family suddenly feels he must have a bath and then everything else must stop until he has finished.

When painful warnings are felt of rheumatism or other illness they like to have a bath. For pains in the limbs, etc., often a needle or similar sharp instrument is stuck into the veins, to bleed the person. The Naskaupi have also many medicines of their own composed of different herbs, among them an effective means of artificial abortion. However on the whole the effect of such remedies is probably more magical than physiological (see CABOT on this point). — Most of these customs are forcibly reminiscent of old popular customs in the subartic regions and are also known in northern Fennoscandia.

It has already been said that the distinction between the Montagnais and the Naskaupee is rather superficial. Fifty years ago TURNER stated that the language of the Ungava Naskaupee was a little different from that of the Montagnais. According to what some Montagnais told me, the language of the Barren Ground Naskaupee differs so much from their southern kinsmen that they had sometimes difficulty in understanding each other, a fact showing that they represent different clans which have lived apart for a rather long time. HIND, on the other hand, stated that the southern Naskaupee, who then lived at the Lake Plateau, could communicate with the Montagnais without any difficulty.



Fig. 272. Naskaupee squaw with children. Photo the author, Davis Inlet, July 1939.

The Naskaupee speak very quickly and with a curious modulation of the voice reminding one of a fretful child, and they often shriek out what they have on their minds; an outsider might think they were quarrelling and highly excited when they are discussing ordinary subjects (995). Their voices are penetrating and carry far; TURNER says that on calm days they will stand and talk to each other, one on each side of a broad river. They can also imitate the cries of animals so well that the latter do not discover their source until it is too late; they can even modulate their voice to lure the shy geese from their hiding-places.

It was only possible for me to collect on the spot some comparatively scanty information regarding the Naskaupee and their way of living, but that was from some of themselves and some Hudson's Bay Company functionaries. But if this is supplemented by the observations of MCLEAN (610), TURNER (963, 965) and CABOT (119, 123), WALLACE (995), WAUGH (1002) and STRONG (909) during their stays among these people it appears that a good deal is known of their condition and customs, and from that it is possible to form a conception of them generally both in former times and at present. The above reports I have freely used in the following account.

The Naskaupee have divided themselves into three bands.

The once vast extent of the country hunted by the wandering Naskaupee may be conceived when, 180 years ago, one finds this people side by side with their allies the Montagnais on the Saguenay, and 100 miles west of the Straits of Belle Isle, places from 800 to 900 miles apart. Since then their country has been gradually reduced and they have finally found themselves in the most inhospitable tracts of the Labrador peninsula.

The Naskaupee, Algonkin Indians' outposts in the north-east, are divided into three territorial clans, or perhaps rather population groups, in agreement with the geographical character of the Labrador Peninsula; cf. Figs 222 and 252:

in the west: White Whale River or Mackenzie River group, whose district borders on Hudson Bay,

in the north: Ungava or Chimo group in the upland of Ungava Bay,

in the east: Barren Ground River [= George River or Mushauan Shibo] or Voicey's Bay group in the Atlantic upland.



Fig. 273. Naskaupee squaw with children. Photo the author, at Davis Inlet, July 1939.

It is wise to remember that many of the accounts which have been written of these people refer to bands living many hundreds of miles apart, and it is therefore no wonder that differences occur in the descriptions of their habits and customs. McLEAN and TURNER and WALLACE tell us about the Naskaupee who hunted in that portion of the peninsula which is styled Ungava; CABOT, STRONG, and WAUGH met the Barren Ground Lake people, who traded in Davis Inlet and Nain; PATER LAURE, PATER ARNAUD and HIND had intercourse with the southernmost Naskaupee who once lived at the Lake Plateau; CARTWRIGHT gave some scattered notes about those who more or less occasionally seem to have appeared on the Atlantic coast between Hamilton Inlet and the south east corner of the peninsula.

Of the above bands the first and the second live outside Newfoundland-Labrador; but as the second band in many cases resembled the third in olden times we shall also consider it here. Naturally the main interest is centred in this last group.

An interesting characteristic which more or less vaguely appears among the Naskaupee is that the bands are still composed largely of kinsfolk, most often a man's sons with their families; a postmarital residence may be either patrilocal or matrilocal. For this reason the principle of the related clans can be thought to be the basis of the division of the bands, as well as the geographical conditions. In recent times however there has been a shifting of families from group to group within the band, or from band to band. PRICHARD reports that the Naskaupee of the Barren Ground band were for many years in the habit of coming out to the Atlantic coast at Davis Inlet to barter. But in 1910 for some reason they made a change, a trading party of fifteen, of whom some four or five were Montagnais, came out to Voicey's Bay, and, abandoning their canoes there, they hired the resident settlers to take them by trap-boat to Nain to transact their business at the Moravian Mission's store. They had never before brought their women to Davis Inlet but three accompanied them to Nain. WAUGH noted that among the Voicey's Bay band (see later on) in 1921 were also some Naskaupee from the Mackenzie River. In the Voicey's Bay tribe there are actually some Ungava Bay people and at least one Montagnais. This circumstance makes any generalisation impossible.



Fig. 274. Naskaupee widow visiting Davis Inlet. Photo the author, Aug. 1939.

It seems to me that here is not only a progressive change in the composition of the population of the small groups, but also a symptom which betokens the breaking-up of the old social order.

Changes in the material culture confirm this. As a whole the old hunting culture as it was at the end of last century and even a few decades ago takes us back to a considerably older stage of development than the one we know among the Montagnais. Since then, however, habits and customs among the Naskaupee have also been subjected to thorough changes at a forced pace and now they are beginning to resemble those of the Montagnais. This transition would be well worth a special sociological study.

Barren Ground Band, later called Voicey's Bay Band.

Few of the Indian bands show so clearly as these the spontaneous changes in customs which come about in the lives of aborigines and revolutionise their way of living when they come in contact with white people. The line between an older phase, B a r r e n G r o u n d p e r i o d, and a younger phase, V o i c e y's B a y p e r i o d, seems to be about the year 1912. (Cf. 1002).

THE BARREN GROUND PERIOD.

In the Barren Ground Naskaupee at the beginning of our century we meet a true hunter people dependent upon game only for their livelihood. In those days they were still managing to live upon the country's natural products. Among the objects of their hunt the caribou was incomparably the most important. Its flesh was their food, their clothes were fashioned from the pelts, the hair worn inside, they sewed with the sinews, the lodges were covered with hides of stags. Shamoyed, slightly smoked caribou skin was their most important object of barter. Yet the herds of caribou were usually accompanied by white foxes and these, with the red foxes, were hunted in the winter and so gave the Naskaupee some extra products to exchange. The prevailing opinion however seems to be that the Barren Ground Naskaupee were never very interested in trapping. Nor did they like the long journeys to the trading posts. It was the caribou that absorbed their thoughts, and they never seemd to care about any great effort to procure furs to exchange for the necessaries which it was possible to obtain from the Hudson's Bay Company stations.



Fig. 275. Naskaupee boy in kulitak of reindeer-skin with the hood drawn against mosquitoes. Photo the author, Aug. 1939.

As stated above (p. 582 sq.) the Naskaupee were pushed north by the Montagnais as the latter retreated before the onslaughts of the Iroquois about a century later than the occupation of Canada by the French. They retreated through the wooded south, and their remorseless pursuers were not shaken off

until the tribe had been pushed up on to the rolling, to a great extent timberless plateau of the interior of Labrador with its innumerable lakes and mountains. After many wanderings the Naskaupee must have found a veritable Land of Promise in the valley where the Barren Ground Lake is. The country was virgin and caribou plentiful. Spruce, alder, tamarack and birch still grow here in the sheltered hollows, woods and marshes are about evenly distributed. The tangled bush housed coveys of willow grouse, while the very rocks yielded



Fig. 276. Naskaupee mother and child. Photo the author, July 1939.

the crouching ptarmigan. There were also hares, Canadian geese, ducks, foxes and wolves. Game on the hills, fish in the rivers and lakes, wood for their fires and tepee poles — what more could they desire?

They learned to live here by the caribou, and while the herds kept to the old migratory routes all went well for the tribe, living secure behind their impenetrable rampart of wilderness, gorging and starving alternately. Thus they existed until the dreadful crises came when the deer and the game failed, as for instance in 1893 (761).

As late as the eighteen-ninety's it seems that this group alone had appropriated the hunting within the wide area north of parallel 54° 30″ and south

of parallel 57° 30″, reckoned from the ocean away to a western boundary which seems mainly to have coincided with the watershed west of the George River. I have however found no proof that they also extended their hunting to any notable extent west of Indian House Lake. As already stated (p. 608) the band gave up the southern part of this area after it had been destroyed by great forest fires, when the caribou herds abandoned it, and now the boundary can be regarded as stretching approximately from Resolution Lake along the Notakwanon River away to the Atlantic. But as we shall see the boundary is fictitious.

The centre of gravitation for these Indians at the turn of the century was the so-called Barren Ground Lake or Indian House Lake [= in older descriptions Lake Erlandson?], an expansion of the George River; cf. Figs 182 and 280. It is somewhat more than fifty miles in length and only one to two miles wide and is shut in on either side by high hills which on the west usually lie a little back from the lake. Long wedge-shaped points — eskers — reach here and there out from the west shore and in some places slope back to the hills in high terraces — fluvioglacial deltas —, the highest more than 150 feet above the lake. On either side of the George River towards the south rise high, rolling ridges dotted with spruce, willow and tamarack. The whole land surface there is seamed with the old trails of caribou that had pursued their age-long wanderings in this desolate region, PRICHARD observed, and each promontory showed remains of deserted Indian encampments.



Fig. 277. A happy Naskaupee squaw with her baby at Davis Inlet. Photo the author, July 1939.

One of the chief places on the route of the immense caribou herds had been, from time immemorial, at the narrows of the lake, and therefore the Indians always collected here in late summer; it seems to have been such an important centre and for so long that Hudson's Bay Company set up one of their trading stations on the northern shore of the lake: Erlandson Lake Post [?]. As late as 1905 WALLACE wrote that Indian House Lake was a general rendezvous for the Indians during the summer months when they congregated there to fish and to hunt reindeer. In the autumn they scattered to the trapping-grounds, where the fur-bearing animals were found in greater abundance.

Prichard noticed that about August [1910] the Naskaupee used to pitch their *tepees* deep in the interior. The chief event of the year, the autumn killing of the migrating caribou, should now take place. From ancient times they had gathered to slay the deer near Barren Ground Lake while the animals crossed the lake on their mysterious journeyings. The hunt took place around the lake and south of the lake along the George River valley as well as east of the river and lake. The hills near the lake were especially cut up by caribou paths and the banks covered with the shed hair of their spring coats. The country round Indian House Lake is reported to have been a veritable place of slaughter (758); all the travellers in this part of the country have noted great piles of caribou bones and antlers.



Fig. 278. Naskaupee beauty of the Davis Inlet band. Photo the author, Aug. 1939.

Let us now look at the great annual climax in the hunting life of these people, the great caribou hunt which took place every year during the latter part of the summer or at the beginning of the autumn when the great caribou migrations of the type still known in north-west Canada began. Both the time and the place for the migrations varied somewhat from year to year and a certain strategy had been developed, forming one of the most systematic hunts I had ever heard described.

About the time the migration might be expected all was activity in the Indian camps. Scouts were sent up and down the George River and when the leading caribou made their appearance signals were given by fire or smoke to the other watchers, for the first deer must not be touched, otherwise the herd would turn away. All must keep silent and quiet until a fair number of the advance guard had crossed the river. As mentioned above the principal hunting-passes were near the narrows of Barren Ground Lake, opposite the large esker landscape with much moss on the hills and grass in the swampy hollows. On all strategic places on the western shore of the lake large wooden fences had been built, thus forcing the herds to reach the shore in definite places, from where they began to swim across (cf. also Cartwright, 134). On the eastern shore opposite these places were the old men and women, who all day long sat watching like falcons, with pipes hanging from their dribbling mouths. When the caribou finally came in sight at the opposite shore they gave the hunters a sign. There was a whisper: *athen* (= caribou), and the primitive hunting passion was released. Everyone became wild with excitement. All control was lost and the result can be imagined.

The leading caribou approaches the lake and plunges in, the herd follows. When the deer are swimming in the lake, the Indians in canoes divide into two parties; the one behind it cuts the flock off from the land, the other spreads round the sides of flock, encircling it. The herd caught between the two is confused and mills round and round; the flock is driven backwards and forwards. Right into them, even up on the backs of the terrified caribous the hunters drive their canoes. They spear right and left, directly into the kidney of the animal and thus stabbed it gives a few kicks and dies at once. The Indian in his lust to murder is said to surpass the hereditary enemy of the caribou, the wolf: It is a case of killing in passing. It is said that they slay as many as a thousand, a terrible massacre of the helpless swimming creatures. The slaughter is also idiotic because not all the flesh is saved; from some animals only the tongue is taken (cf. 1009).

The chief means of support for these hunters was thus that of the prehistoric period, although they were well off for guns. In favourable years the spear alone furnished anough caribou for their main support.



Fig. 279. A fine Naskaupee rascal at Davis Inlet. Photo the author, Aug. 1939.

At one time hundreds of caribou carcases lay piled up and decaying at the traditional camping-place of the Barren Ground Naskaupee at the mouth of the Tshinutivish Brook, Fig. 281, which runs from the east into the great lake, writes CABOT. PRICHARD wrote that the whole country near the George River was covered with caribou bones. Another noticeable fact was that rarely could one look round the sky without seeing flocks of ravens, he added. WALLACE, too, (1905) wrote that the George River all the way down to the Barren Ground Lake had been in past years a veritable slaughter house. There were great piles of caribou antlers, sometimes two or three hundred pairs in a single pile, where the Indians had speared the animals in the river. Abandoned camps were distributed at frequent intervals. Countless multitudes of caribou have no doubt been slain in this manner in Indian House Lake. The hunters might kill a whole herd, leaving nothing for breeding purposes. No judgement was shown, and yet they must know better than anyone else that to clear the country of these animals is to face starvation. The band has also learned that Labrador is a bitter mother; there were few years when one month or another did not see the Naskaupees face to face with famine, this is more especially the case just with those Indians who pass their lives in the most remote and poorest part of the peninsula.

The caribou are erratic in their movements, as has been stated several times, and can never be depended upon with any degree of certainity. And should the Indians fail in their hunt they are face to face with starvation, as was the case in the winter of 1893—94, when fully half of the people perished from lack of food (955). Nor is it easy to judge how the caribou will move during the year; many causes may alter their direction. According to information obtained by CABOT when visiting the Barren Ground Indians at the beginning of the present century, their northerly migrations have for a long time extended to near the coast. After the great forest fires mentioned above the migrations shifted towards the interior and the Indians had to keep watch on several other hunting-passes. One such was in the great Lake Mistinipi (cf. CABOT's



Fig. 280. Looking upward over Indian House Lake from about the Tshinutivish Brook (761).

map in 119) where the sound over which the caribou often swam was a third of a mile broad, and six to eight miles from the east end of this lake.

But the Indians also collected to hunt caribou at other times of the year. For instance the country round about the head-waters of the larger riverways were common meeting-grounds in the old deer-hunting days at the fording season of the migratory caribou.

Even then, it was said, the game was unlimited and therefore Indians from Ungava Bay also joined them sometimes though they had fine hunting-passes on the Koksoak River, and it is also not surprising that such attraction drew thither some of the Davis Inlet Group, especially the so-called Shango Indians, or the Rich family; they lived almost as parasites on the Naskaupi (p. 657). There was plenty of room for all; about 300 square miles per person. Furthermore this area could easily be doubled if the extremities of their recorded wanderings be taken as indicating their territorial limits (909).

Small parties of caribou were also hunted in summer. The horse flies and mosquitoes which are such a plague to the white man are friends to the Indian hunter, for they cause the caribou to gather in small parties.

Deer decoys were often used, i.e. groups of large erratic boulders, each boulder topped with a smaller one. Viewed from a distance they look not unlike a herd of grazing deer.

These hunting methods are known all over arctic Eurasia.

The Barren Grounds (749) are to be considered rather rich in food in summer, but no place is poorer in winter; so that the band was compelled to retire to the woods in the late fall. There they passed the season hunting caribou, small game and some fur-bearing animals. PRICHARD says that in August the Indians shoot the young Canadian geese, spruce grouse and ptarmigan. Trout also were eagerly sought after by the Indians when the caribou were scarce. This fish was also caught through the ice, a weary work requiring patience and endurance. Nets and fishing lines of their own making, either of babiche or twine, rarely failed to take food enough during that part of the year when caribou flesh was unobtainable. Especially in early spring, when hunger more or less regularly troubled the Indians, the unfailing wooden hook of ancient days dropped through the ice-hole helped them over the crises. The hooks were made of wood and caribou bones, consisting of two pieces about four inches long tied together in the middle which, when the fish bites and the fisherman strikes, separate and stretch across the jaws of the huge trout.



Fig. 281. The Barren Ground Naskaupee's camp near the Tshinntivish Brook at the eastern shore of Indian House Lake, Summer 1905 (119).

As has already been stated none of the Barren Ground Naskaupee were specially prominent as trappers at this time; the fur animals they caught were only a few ordinary and arctic foxes. Therefore some energetic trappers from the Whale River (= Mackenzie River) Naskaupee (from Hudson Bay, they trade at Fort George) used to join the group for this purpose.

Tools and implements were largely of bone and antler: arrowheads, fish-barbs, skinning tools of bear tibia, cut obliquely, hair-scrapers of caribou leg bone sharpened at one side, etc. In woodwork there were shallow bowls,

spoons with flat wide bowls, needles for sewing hare-skin garments and robes, net needles, canoe mallets, knife- and awl-handles and net-floats. Shelter was provided by the conical, many-poled caribou skin tepee; Figs 281 and 282. The hunters' temporary shelter was an open-topped, head-high windbreak of skin thrown about the poles. Light came from wood fires, protection from cold depended solely upon the immense fires built low within a trench in the snow.

The likness to the material culture of primitive Lapps is very striking.



Fig. 282. Evening effect in the Barren Ground Naskaupee's camp at Indian House Lake in 1905 (119). The construction of the scaffold is precisely the same as the Lapps' 'suonjer' and the tepees as the Lapps' 'lavvo' (watch tent).

Judging from the information I collected a primitive kind of communism existed among these Naskaupees even in times very recent. McLEAN, nearly a century ago, said that nobody could show so little selfishness towards his equals as these Indians. CABOT, who knew their conditions well, gives us some examples of this, and says that it would be difficult to find a people more devoted to their own tribesmen and more ready to make sacrifices for them than the Naskaupee. This mutual helpfulness finds expression not least among their hunting regulations which are very ancient in type.

The Barren Ground Naskaupee have never had individually owned hunting districts. They always hunted in company and the booty belonged to the group as a whole (123). They had usually plenty of caribou flesh and were very wasteful of it, and it was the same with other edibles, fish, birds and eggs. Even if deer decoys were used and a hunter was alone or with a few others he, according to hereditary custom, only took some dainty pieces of the caribou he had killed, e.g. the head and the fat round the entrails, while the rest went to the whole clan. There were many strange regulations for the hunting. One curious rule among the Barren Ground Naskaupee was that if two men were hunting together and the one shot an animal, the skin fell to the man who saw the shot discharged. But in any case the main rule of late years is that game of any kind belongs to the one who sees it first; he lays the flesh in the caribou skin and slings it over his shoulders like a rucksack. McLEAN (610) said in 1849 that if a caribou was only wounded, and could still run a little, it was considered to belong to

the hunter who first reached it. — The same writer also noticed a curious example of community of goods in other respects; when an article had been bought in the Company's store it seldom remained in the hands of the purchaser for longer than two or three days. The rapidity of interchanges may be greatly facilitated by the practice of gambling so common amongst Indian tribes, HIND considered.

Superstition had created a complete dogma regulating the relations of the hunter to the guardian spirits of the game. As a sign of reverence for these spirits the skull of the animal killed had to be hung on a pole over the tent. WAUGH found two bear skulls, one facing north and the other south, lashed near the top of a pole with stones piled around at the bottom to keep it upright. The skulls were painted with vermilion, a circle around the snout, circles round the eyes, ears, round the top of the head and the lower edges of the jaws, and a strip from between the eyes down the top of the nose. He also found bundles of bones of various animals suspended on poles set up in the ground on small trees. A trout skull was suspended in one of the meetchwops.

As regards the socio-religious practices during this period it is known that they seemed to agree with what prevailed among their neighbours in the north, the Chimo Naskaupee. We shall discuss this later.

The unrestrained joy of living of the child of nature is said to have been very distinctive in the primitive community of the Naskaupee at this time; they knew how to live happily even with their small resources. For days after the caribou spearing-battle the hunters would sit by their fires and there enjoy the greatest luxury the wilderness provides: the marrow of the caribou. If the game was plentiful and the hunt succesful the encampment would remain for weeks in the same place and the Indians eat and eat of the common stock of meat till it was all gone. And then they began to hunt again. The Naskaupee have known the art of producing intoxicating drinks from berries and could do this in a few hours. How they made the juice ferment even in winter is a riddle which no outsider has yet solved. Like aborigines in general they loved to become drunk, it is said; it was perhaps for them a kind of magical action by means of which they gave their spirits an opportunity of rising above the earthly life, and this could continue for weeks. One of my informers, who was supposed to be an expert, considered that this drinking had not only harmed their livelihood but also undermined their health. In other ways this desire for liquor has been a misfortune, for some smart traders are said to have taken

advantage of it to secure their skins at very low prices. It is therefore not surprising that it is forbidden by law — at least since 1857 (325) — to sell intoxicating liquors to Indians or Eskimoes, or even to offer them a drink; the legal fine for the latter is 200 dollars.

It was said that the Barren Ground Naskaupee long remained isolated from the outer world. McLEAN (610) describes the Naskaupee of Ungava as very averse from locomotion; many of them grew up to man's estate without having visited a trading-post. Before the establishment of Fort Chimo they used to meet in the interior and give their skins to an elderly man of the tribe who took them to the King's Posts (six trading-posts between Seven Islands, Lake St. John and Tadousac) or Eskimo Bay (Hamilton Inlet included Lake Melville) and traded them for such articles as were required. Dominique, the chief of the Montagnais of the Moisie River, told HIND in 1861 that at the southern end of Ashuanipi Lake there were some Naskaupee families who had never been to the coast before. All Indians at Ashuanipi who did not come down from the Moisie went to Petitsikapau near the Hudson's Bay Company post or to the coast of Hudson Bay.



Fig. 283. Naskaupee squaw with baby visiting Davis Inlet (536 a).

In olden times, as at the beginning of this century, Fort Chimo at the estuary of the Koksoak River seems to have been also this group's chief trading-place, especially in winter. The very scanty store of civilised luxuries which found their way to the Naskaupee was obtained here by exchanging smoked skins, moccasins, and pelts mainly for aliments and munitions. But they also bought tea, tobacco, matches, large fish hooks, brightly-coloured cottons and clothes and wools for embroidery; mouth organs were also popular.

They examined the articles before purchasing them, carefully weighing them in their hand, for they must think of the long portages where every extra ounce is important (761).

Sometimes the men of the band used to pay hasty visits to Davis Inlet or Nain to trade,but the road to the Atlantic was troublesome. The road to Davis Inlet followed a deep valley the river of which was filled with rapids but with more than twenty lakes, and finished with the Assiwaban River system; even when water conditions were at their best this was a trying journey because the heavy loads of the canoes had to be carried over the many portages. Yet the journey went quickly, for the Naskaupee are masters in handling their light, open canoes; I was once amazed when I saw small boys paddling their way Fig. 290. The Barren Ground Indians for this reason generally visited Fort Chimo in summer; then they carried the canoes over to the Whale River (the Naskaupee call this river Manouan = the place for egg collecting) with its many rapids and then by different ways came to the Koksoak River. Cf. Figs 285—287.



Fig. 284. Some future hunters of the Davis Inlet band. Photo the author, July 1939.

The idyll in the wilds was, however, not everlasting. The caribous' migration paths were changed in some years, and sometimes the Indians met only a few caribou and starvation visited their camp. It is therefore no exaggeration to say that the Naskaupee were completely dependent upon the caribou for their existence. When it failed they were forced to go to the coast where they could perhaps supplement their hunting trips with trade and begging. They had never hunted sea mammals, for they had previously always lived in the interior, only visiting the coast in the summer to trade. When the caribou chose definitely to take up new, unknown paths of migration it was a catastrophe for the band.

The Voicey's Bay Period.

In 1927—28 the band numbered 56. They spent much time at the coast, chiefly at Voicey's Bay, and made hunting excursions from there, says Strong. In 1939 the band numbered about 100 persons.

The Davis Inlet (cf. p. 654) and Barren Ground bands have always, as has been said, been dependent on the migratory caribou. Their ritualistic practices mostly centre round it. The headquarters of the Naskaupee were still in 1910 on Indian House Lake, the shores of which have been for generations the battle-ground where this little tribe has had to fight for its existence (761). Some fifteen years ago, STRONG stated in 1929, the main herd of caribou suddenly stopped coming to Indian House Lake, due, the Indians believed, to their ancestors' neglect of the caribou rites; in this part of the country great piles of caribou bones were still to be found and they said that the living caribou 'smelled' these bones and turned back to 'C a r i b o u H o u s e', a mysterious mountain into which the 'C a r i b o u G o d' took them (cf. SPECK, 877). From the descriptions it seems as if the life nerve of the Barren Grounds Indian's existence had been broken by the catastrophe of the caribou's changed migrations.



Fig. 285. Naskaupee Indian of the Barren Ground band in 1909 (761).

Why did not the band start out to find the new migration paths? Can superstition have so completely blinded them that they did not even try to discover the herd's new paths in the tundra to the north-west? Possibly another circumstance was the cause of their resigning themselves to their fate in this matter. As STRONG says, the material culture of this group varies very little from that of the Chimo Naskaupee described by TURNER and depends to a great extent on the presence of forest, and this inability to live in forestless regions apparently prevented the Indians from finding out the whereabouts of the main caribou herd.

CABOT (123, p. 196) who twice visited these Indians at Barren Ground Lake stated that few of them were regular visitors to the eastern coast of the peninsula. However in 1912 just before Christmas the Naskaupee came once to camp near Voicey's Bay, a couple of miles away on the south side of the Bight (to the south of Voicey's), WAUGH (1002) reported. A Hudson Bay man from Davis Inlet came and drove them away or persuaded them to leave and go with him by promising a lot; he thought they had a great many skins but was mistaken. Next year the band came again and has been coming ever

since. The Indians camped in the same place until 1918 when they pitched their camp quite close to Voicey's. From there they usually go back into the country in between to trap. In the summer of 1939 they also stayed near Voicey's.

Their hunting-grounds are now always in the forests, but they do not extend to the forest limit. They generally camp near lakes for they still often fish through the ice for trout.

On the hunting-grounds they usually divide into two groups: a larger group going north from Voicey's Bay, while the smaller group has its land to the west of it. Yet the idea of definite hunting areas for each group seems to be largely lacking among these people; e.g. if it is necessary to have many hunters to surround a herd of caribou they often unite for that purpose and separate again afterwards. Each group has thus a huge general area for hunting and fishing, but if one party is specially successful they are visited by the less fortunate (909). Fall-traps are made by the Naskaupee for wolverine and bear, WAUGH noted, and caribou snares are placed among the trees, or the animal is speared. Spruce partridge are captured with a noose on the end of a pole. The chief fur animal is the fox but also some few mink and otter skins are exchanged at Hudson's Bay Company's posts. The idea is justified that the eastern Naskaupee can under present conditions — the plentiful supply of game, fish and fur-animals and the absence of competition — manage quite well with the products of nature in their part of the country.



Fig. 286. Naskaupee Indian of the Barren Ground band in the summer of 1905 (119).

Regarding the migratory habits of the band nowadays I received the following information in 1939 from Mr. BUDGEL, the representative of Hudson's Bay Company in Voicey's Bay:

In the middle of May they are generally to be found with their families in camp at Voicey's Bay; there they remain till the middle of June when they return to the interior. Some of them from their true country to the east make hunting excursions to the barren district in summer as in the olden days of caribou migrations; some of them have taken courage and begun again the

great caribou hunts near Indian House Lake which start in July, but in principle most of them have given up the caribou for the fox. They stay in the interior till the middle of August when the men come down to trade, but only stay a few days and then return to the hunting grounds.

In the middle of November the men again come down to Voicey's Bay with their skins to get food but soon return to the interior; they are back again after a month with a fresh supply of skins to exchange for food. After that they remain in the hunting grounds till May.

With the band's move to the forested areas a striking change in their dwellings has also occurred. At the beginning of the century the movable tepee was the dwelling of the hunting-people in all weathers. Now they use the same type of meetchwop as the Montagnais — Fig. 262 —, of calico and with an iron stove, and, as far as I could discover, never the tepee.

According to WAUGH small tents (*midjua'p* or *mitcuap*) of canvas or caribou skin are used while hunting. They also make a full-sized tent of poles set closely together and covered with spruce boughs (a fire inside). This is a hunting shelter too, — *citagwen'tcuap*. Also big rectangular tents for two or three smokes or stove-pipes WAUGH found in use; cf. p. 655. It is interesting that STRONG (909) saw these Indians occasionally using snow houses when caught out in a storm on barren ground. The relation of this house to the block-built Eskimo structure is uncertain. It is of rather unusual type: a heap of snow is piled up and allowed to freeze for half an hour, it is then hollowed out with a snowshoe and deeply bedded with spruce boughs if such are available.

The Naskaupee of olden days have gone, like the caribou they hunted, and the hunters wander about to-day in the woods near the Atlantic coast. Rotting tent poles on the George River and Barren Ground Lake tell a sad tale of life in these now deserted parts and speak as if from the grave of a race that has passed away (761). The descendants of the Barren Ground Naskaupee are no longer a tundra people; in the forests they are in their element to-day; the tundra is the despised land, without wood, without fuel, one can freeze to death there. Yet the call of the life of freedom seems still strong; they prefer to live in the forest wilds and seem to have little or no intercourse with the whites or the Eskimoes and they even seem to be outside the limits of the Catholic Mission. They are said to retain their old religious ideas — their chief deity is the Caribou god — whom they believe to be angry with them (p. 678). As a result even the Davis Inlet people are very careful concerning the taboos affecting the caribou. On this account for instance the sacred grease prepared

on ceremonial occasions may only be eaten in the lodge, and the plate cleaned at once (909). They are especially concerned with preventing the dogs from touching the head, horns, or long bones of the caribou.

The Ungava or Chimo Band.

The isolation of the northern Labrador enclosure has caused it to become a vast preserve of primitive elements which belong fundamentally to the vast



Fig. 287. Naskaupee of the Barren Ground band in 1909 (761).

circumpolar culture belt (871), and this concerns especially its northernmost section, where the Ungava band or Chimo band now lives. This band is now quite small. According to WAUGH there were about 50 Naskaupee at Chimo (12 men, a few more women and some children). Sometimes Naskaupee from farther west also come to Chimo. Earlier the group was estimated at about 500 souls. The band really inhabits a district outside the country here treated, but the information regarding it obtained by TURNER fifty years ago and by WALLACE in 1905 seems to throw some light also upon the conditions and ideas which must be thought to have prevailed among the Barren Ground Naskaupee during the period to which we have given that name, so they will be considered here to some extent. We shall follow TURNER's report.

The annual cycle.

The Chimo Naskaupee had special activities for each season of the year. In the autumn the old men, the women and the children were left in a fixed camp while the hunters with the older boys spread out in small groups to hunt during the autumn and winter. Now and again the hunters would visit the main camp to bring them game and other foodstuffs there.

In early summer when the rivers broke up the hunters went to Fort Chimo to exchange the result of the winter's trapping. But before they started they sent word to the main camp which was then struck, and the company started by short stages and many halts for rest to the trading-post. There they all met. There they settled their business; their favourite haunt was the shop, and with endless discussions they exchanged their skins for all kinds of goods: guns, ammunition, tobacco, cloth, flour, biscuits, peas, beans, rice and especially sugar and molasses. Usually the manager of the station could get the Indians to bring down the logs and firewood he needed for the winter. Sometimes also a few Indians were engaged to help with the salmon-fishing organised by the Company; but most of them proved unfit for such work, because if any game turned up in the neighbourhood they went after it, leaving the nets at the mercy of the winds and waves which so often meant their loss in the strong tides of the Koksoak River estuary. The whites could always rely more upon the Eskimoes than upon the Indians to do regular work.

When the men had agreed where the summer and autumn camping-place should be the people moved there and the hunters spread out in groups to find the game for the band to live on. In the autumn the tribe again moved up to a common camp in the forest south of Fort Chimo and with that the simple annual cycle of their economic life was concluded.

At that time the Naskaupee knew the habits of the animals in that region so well that they could usually point out with certainty where they would be found. Of course the caribou was still incomparably the most important and gave them all the food and clothing they required. The Chimo Naskaupee, like many other Indians, lived like predaceans on the caribou and it may be said that their whole life was based upon this animal. If they lacked caribou meat they considered they were starving, however much other game and fish was at their disposal. The caribou they procured in different ways.

To understand their hunting methods it is good to make acquaintance with the main lines of the caribou's habits in the Chimo district half a century ago.

In the spring the does leave the herd and go away to the forestless hills and mountains near Cape Chidley. There the wind has blown away the snow from

many spots, and there some lichen and last year's grass is always available for the caribou even after the snow surface has hardened in the woods and made grazing difficult or impossible. In the latter part of May or the beginning of June the does seek out some spots protected against the snow storms and early freed from snow, and there give birth to the calves. When the latter have grown somewhat they follow their mothers to other places in the mountains where there is summer grazing in the meadows among the hills where it is cool and the wind blows away the mosquitoes and other insects. Here the bulls also come later in summer. Thus in summer the caribou are to be found now here, now there in the mountains in the north-east, for they always move against the wind.

When autumn comes and the insects are no longer troublesome they collect in small parties each with a bull as leader and go down to lower districts, especially the areas of fine lichen near the Koksoak River where it is moist and tasty at this time. They were so regular in their migrations that they might have had a calendar, it is said in the old descriptions. In August the skin of the young caribou is suitable for the Indians' clothes; that of the female was used for this purpose while that of the male was made into leather and babiche. The fawns' skins were reserved for making children's clothes and underclothing, the fur next the body. The skin of the old animals is best in October and they are then also fattest; the fat on the back can be ½—1 inch thick. It is now time to prepare for the great autumn hunt.

The caribou rutting time is October. This is the best season for the Indians' hunting. Driven by the sexual instinct they wander in small herds to and fro over the rivers. At certain places the animals like to swim over the great rivers, and at such hunting passes occurs the same senseless slaughter as that already related in connection with the Barren Ground Lake (p. 670 sq.). WALLACE reports that an agent of the Hudson's Bay Company told him that he had seen nearly four hundred caribou slaughtered in a few hours at the Koksoak River (995). Then the whole camp jubilates; a magushan is arranged, the drums roll. We may, however, think that the senseless murdering of the caribou is justified by the Indians' outlook, he believes that the great Caribou spirit sent him the game (cf. p. 688).

There were also big hunts in the winter when the snow was deep and prevented the animals from moving or the hardened snow surface could bear the hunter on his snowshoes but the caribou fell into it. The animals were also caught in snares; and they were sometimes driven by a few hunters into deep banks of snow where they were unable to help themselves and could be speared at will (995).

The Fort Chimo Naskaupees also devoted themselves in winter to the trapping of fur-animals and hunting of small game, chiefly hare, and birds were caught by the thousand. In the summer women and children collected eggs in great numbers, and salmon were caught in the great rivers. In the lakes other fish were caught with net or hook, in the winter through a hole in the ice.

After the autumn slaughter the bodies of the caribou were generally skinned and left to dry on the river banks in the sun and wind. If the supply of meat was small it was dried over the fire in the tepee until it was friable and had a slight taste of smoke, and this is still done to-day by all Naskaupees. Then it was ground to meal and placed in a leather bag or a bladder with pure suet, and the mixture became kneaded together into a mass, *wutu't*, which is nothing else than what polar explorers call pemmican; this strong food is thus an Indian invention. Another of their special conserves is called *uinastikai* and is prepared by mixing in the caribou's stomach blood and a mass of partially digested lichen from the entrails of the animals; the mixture is boiled and evaporated and becomes a brownish, granular mass like gunpowder. When in winter the hunter went off for the day he put a handful of uinastikai in a cup of water and drank the mixture; he needed no other food until he returned from the hunt. The Naskaupee also loved marrow. But his greatest delicacy was the caribou foetus.

The Naskaupee liked berries so much that it is said that they made »berry farms» by burning a piece of forest land and growing berries there, chiefly kinds of bilberries and cranberries, which they picked and boiled to a concentrate in the form of cakes. They are also very fond of cloudberries which they use as a prophylactic for scurvy (799, 119).

At the beginning of the century when CABOT was among them, the Naskaupee used neither bread nor salt. The food was always boiled; the drink was lukewarm water; they never drank ice-cold water as do the Eskimo.

— On the basis of his observations in the winter of 1905—06 WALLACE (995) gives some information which supplements TURNER's notes about the Chimo Naskaupee: With open water in the summer the Naskaupi came to the Fort with the pelts of their winter catch. During a short rest, they exchanged them for arms, ammunition, knives, clothing, tea and tobacco, then disappeared again into the fastnesses of the wilderness above, to fish the interior lakes and hunt the forests, and no more was seen of them until the following summer. The Ungava Indians thus never go to the open bay in their canoes: it would bring them bad luck, they believe, for there they say the evil spirits dwell. Of all the Indians that visited Fort Chimo only two or three had ever ventured to look upon the waters of Ungava Bay, and these had their view from a hilltop at a safe distance.

Only a few of the younger men used to emerge from the silent land in the south during Christmas week to barter skins for such necessaries as they were in urgent need of, — and to get drunk on a sort of beer, a concoction of hops,

molasses and unknown ingredients that the Post dwellers make and dispense during the holiday festivals.

Thus at that time the Naskaupee were a really primitive hunting people. Their simple

Social conditions

were in agreement with all this.

The tribe had a chief who had sole control and determined the arrangements of the hunting and the distribution of the game, etc. The chieftainship seems [?] to have passed from father to son, or another near relative if there was no son. In the Chimo group the chief collected a certain tax; of all game taken he kept one of ten skins for himself. In later times the Canadian Authorities had given him a police star with the word »Chief», which he proudly wore on his chest. No other arrangement tending to social control existed.

The division of labour between the sexes was definitely fixed by ancient custom (606): the only worthy task for the man was then, as now, the hunt; the woman's was to serve him like a slave and blindly obey his orders and whims for good or ill.

Prichard reminds us that in civilization a woman's work is never done, and far more is that true of the helpmate of the semi-savage man of the Barren Grounds. Among the Naskaupee the women are the slaves of the men, McLean (610) notes. When they move from camp to camp in the winter the women set out first, dragging sledges loaded with their effects and such of the children as are incapable of walking. Meantime the men remain in the abandoned encampment, smoking their pipes, until they suppose the women are sufficiently far advanced on the route to reach the new encampment where they overtake them. The woman has to pitch and break camp, to cook, to cut up and carry her husband's kill, to dress the skin of the deer, to fashion the foot-gear and the greater portion of the clothing. On a journey she often paddles the canoe, and at the portages she carries the heavier load. The squaw's life is not easy, but emancipation will probably never come; in the wilderness the provider of food, Man the Hunter, has reigned, reigns now and ever will reign. The laws of the Northland do not change (cf. also 761).

A hunter took a wife when he was quite young, that is when he could provide for her; sometimes the girl was only fourteen or fifteen years old, or even younger. No betrothal or marriage ceremony was known, except that the girl was asked if she would live with the suitor. If she refused it often happened that she was taken by force. The fetters of a marriage by capture are said to have always been very weak and could be broken for the least cause by the one or the other party. 'Shanish's uncle took his wife away from him and he was obliged to be satisfied with another', reported Waugh. Intermarriage within the band was the usual thing.

According to McLEAN polygamy was practised and it was not unusual for a man to marry two sisters one after the other, or both at the same time; HIND tells in 1860 of a Naskaupee who left two wives-sisters. All the wives usually lived with the hunter in the same tent, and when jealousy broke loose among them it is said that there were terrible fights and an awful noise until the hunter himself, who at first lay on his back and laughed at them, found it was time to interfere and shouted at them to stop. The Indians told WAUGH that a few decades earlier their forefathers still used to have two or three wives sometimes. Even to-day polygamy is tolerated in principle though difficult in practice because of the lack of women; during this century there has scarcely been more than one man among the eastern Naskaupee who had two wives at one time; though WAUGH reports that 'Adaka had a young girl in addition to his wife' (wife and concubine). Relationship is no hinderance to sexual intercourse out of wedlock; incest is said to occur. Nor were promiscuous relationships rare among these Indians, but sexual intercourse outside the tribe is said to have been unknown.

As paternity was often uncertain the Indians had agreed to regard as the father the man with whom the mother was living when the child was born. While the children were growing up the boys always enjoyed every advantage at the expense of the girls.

The men, as has been said, know only one task in life: to hunt. It falls to the wife's lot to slave in the camp so that before she is thirty years old she begins to look worn out and when she is fifty she is an old woman and ugly as a witch. But a Naskaupee woman knows no other fate; she is brought up to it and cannot think of wishing for anything else. She understands, says CABOT, that the fate of all depends in the last resort on the hunters. And she knows also that it is usually the women and children who survive the famine time, while the men in attempting to procure food for the camp die from the hardships of the wilderness.

SUPERSTITION.

The country inhabited by these Indians is precisely such as would engender and foster superstitious ideas (435). The Chimo Indians' conceptions of the highest powers in creation are attractive; they reveal something of their mental life and explain certain habits and customs. In many respects these ideas, according to TURNER's notes, resemble very much the old ideas of the Labrador Eskimoes.

The whole existence of the Naskaupee has been terribly ruled by superstition. Nearly everything that happened was due to the action of the spirits. Every incident of life was associated with the supernatural, everywhere the Indian sensed the active participation of non-human agencies. According to TURNER there were many spirits, of whom the less obeyed a great spirit who lived in the sky [— can this be a new acquisition they have adopted from the Catholic Mission?]. The spirits were generally regarded as being unfriendly towards humans.

An evil deity, Atshem, was the Terror and bugbear of the Naskaupees. They believed that he assumed the form of one of the most dreaded conjurors of olden times, or, as a frightful giant, wandered through the forest in search of human prey. When the report spread that his tracks had been seen near the camp, the Indians fled in consternation from the neighbourhood, and lived for weeks or months in continual terror. Time and again therefore the spirits had to be propitiated by sacrifice. Such sacrifices were demanded by the spirit of the individual as well as by the spirits of natural objects. Sometimes the spirits appeared in different guises and it was important to know in which of these a certain spirit acted. The only one who could reveal this and knew the right way to deal with them was the shaman, and it was dangerous to offend him by expressing doubt of his art. Shamanistic powers were entirely the result of personal predisposition and were not inherited, though they might be passed from one living man to another (909).

The shaman was the oracle. At least until quite lately the rite demanded that the shaman should be hidden from the eyes of the tribe while he was performing his mystical incantation; cf. Fig. 264. For this purpose he withdrew to a little skin tent — t h e s h a k i n g t e n t —, which was sewn together with great care so that no ray of light could enter it. After installing himself in the tent the shaman began to mumble, but gradually raised his voice till it became shrieks and screams which were heard far away. Finally the drums were used and the tumult increased until the magician fell into a trance. Then he could tell the anxiously waiting suppliants outside that the spirit he wanted to see had appeared, and he was asking his assistance for the desires of his clients. After a while he told them that the spirits had come to his help. Then the shaman's tent was pulled down and the ceremony was over.

Sometimes the shaman could reveal the meaning of a hunter's dream after a few minutes.

According to what I learned the shaman seems always to have had a favourable answer. If this was not so he said it was because some necessary action had not been performed or some circumstance had not been told him by the client; — for instance that someone had broken off a twig, or turned a stone on its side or something similar. This had offended the spirit, who withdrew without saying the whole truth. Then the client had to pacify the spirit with a sacrifice, and the shaman decided what this should be; — he usually chose something which was difficult to obtain so that he himself had time to provide against any possible doubt as to his power, says TURNER.

Simplicity and individualism characterize the institution of shamanism in Labrador, which lacks organisation just as the other non-material cultural elements (871). This shamanism seems to have been a quite harmless kind. It is a long time since the conjurors have induced the Indians to commit outrages or bloodshed and murder. It is known that in 1831 the Indians of Rupert's River and James's Bay attacked the Hudson's Bay Company's post and killed 12 persons (435). This is however the last Indian insurrection against the whites of which I have found any note in what has been written concerning Labrador.

The idea that every animal consisted of a body and a spirit played rather an

important role in the life of this hunting people. This spirit belonged to a lower order than the spirit of a human. The animals' spirits are, like all others, indestructible, and if the body containing it is destroyed it can spontaneously again take upon itself the material form in which it had previously lived. But this implied, according to the Naskaupees' idea, that even if an animal was killed its stock was not decreased, because the spirit only deserted the dead animal to incarnate itself in the form of another animal of the same kind. Thus death only meant that the spirit left the corruptible, material form. But it sometimes happened that the spirit withdrew for some time to its original home, e.g. to the 'Caribou god' who rules over all the caribou spirits, and this could have dangerous consequences if for example the incarnation did not take place very soon, for in the meantime the humans might be obliged to starve. In this case the conjuror could intervene, for he had the power to attract the spirit and persuade it to take again the guise of a caribou. Notwithstanding it was well for every hunter to be careful to be on good terms with the animals' spirits. Never for instance must the dog gnaw the killed caribou's bones (p. 675). For this purpose he also carried a piece of the skin concealed on himself as an amulet; if the booty was a bear the underlip was cut off and its flesh side painted red with hematite powder mixed with fat, and this was a fine amulet. In 1860 the Naskaupee men were still tattooed on the cheek for the same purpose, generally from the cheek-bone to the nostril on either side. HIND was told that the women also were often tattooed. WAUGH reports that totems did not exist.

This is not the place to go into details concerning this attractive but little studied subject. The reader is referred to TURNER's and SPECK's works. — The belief in supernatural owners of the game is widespread in the rest of Labrador also, and according to SPECK it is apparently exclusive to the Montagnais-Naskaupee among northern Indians. In northern Fennoscandia we know that the same conception has existed or exists; amongst the Skolt-Laps he is called Kufedar. It brings up again that perplexing question of eastern North-American and Palaeasiatic correspondences (871, 915).

The Labrador Indian's activity consists wholly of hunting, setting traps, and fishing. It is clear from what has been said that if the hunter desires success he must conscientiously observe certain inherited ritualistic manners and customs. The trapper was compelled to act *mentu* (cf. SPECK), which meant in a way that would please the invisible powers. In hunting and trapping these non-material factors were at least as important as the mechanical exercise of the hunt, which thus became a ritual action. In some way the hunter dematerialised nature, says SPECK. This explains why it was so important to know the right way to deal with the supernatural powers who control and guide everything in the life of the Indian hunter. For this reason he must be careful with the remains of the carcass and avoid anything which could offend the animals' spirits and disturb their comfort, delighting them with feasts and the drums before and after a good hunt.

In 1853 PATER DUROCHER made some notes about the southern Naskaupees. These believed that the spirits of particular animals would become hostile to them if they gave the bones to the dogs. At certain feasts they sacrificed the flesh of animals killed in the chase by burning it to cinders. In times of scarcity they sang and danced to the sound of the drum until they fell down with weakness, in order to get a glimpse in their dreams of the places where the wild beasts congregate.

In the difficulties the Naskaupee has in procuring food and clothing in this extremely poor country he believes that his dreams guide him in his actions. He therefore follows his d r e a m s with the utmost precision, wholly regardless of any consequences other than those to which the fulfilment of the dream may lead him.

When anyone was sick the Naskaupee sang until they were overcome by sleep, in the hope of seeing in their dreams the enemy who had cast a spell over the invalid, or that they might discover the herbs which were capable of effecting a cure (435).

In the time of the Jesuit missionaries also the Montagnais were noted for their reliance upon the power of their dreams as explained by their conjurors. They believed and still believe that in dreams they were in direct contact with the spirits who watch over their daily life. When the Indian dreamed of firelight on the ground (?), it meant that the caribou were on their way to his land. But it was not given to everyone to correctly explain the dream, so that the interpreter of dreams held a very important position in the little company. Such work belonged in the first place to the conjuror or some other Indian who had been declared an expert.

A ceremonial feature connected with dreams diffused over the whole north is s c a p u l i m a n c y, divination by means of scorching an animal's shoulder-blade and observing the cracks and burnt spots. This practice of divination is general and fundamental among the Montagnais-Naskaupee hunters. As SPECK points out we encounter in this idea one of the most significant indications of circumpolar culture affinities that can be cited (871); (cf. Fig. 255). The individual hunting ceremonialism is well illustrated by the following passage which we find in SPECK (877): »You speak about singing for game», said Petàbana of the Ungava Naskaupees; »about using the rattle and drum before and after dreaming about the caribou. Yes! I have a song and I dream songs, and read the shoulder-blade divination. They all do, he» (he pointed to Mictaben, who sat near), »he» (he pointed to Nabe's) »in fact all: That shows we kill the animal and live».

These Indians conceived of the dematerialised objects of nature, the spirits, as real beings, in about the same way as seems secretly to have been the case — and perhaps still is — among the half-nomadic Lapps in Finland. The spirits of the animals are to a Montagnais and a Naskaupee as real as their visual observations: no one among them would dare to doubt the existence of the cannibal giant Windigo, the under-water people, the owner of the caribou (N.B. the Skolts' Tshats'ile and Kufedar), for their ancestors had depended on them and the spirits had always given them success with the game so that they

could live. The witness of the shoulder-blade and the bear ceremony (see SPECK 877) call to their minds things as actual as canoes and snow-shoes. Thus for both the territorial Indian clans in Newfoundland-Labrador an unbelievable number of invisible beings move about the mountains and the wooded valleys. They are especially active when darkness falls and that explains why every sensible savage in Labrador — like in general everywhere in the Old and the New World — does not like to be out after dark, for one cannot know whether the unseen powers are out on friendly or unfriendly errands. In this way the ideas of the Labrador Indians resemble somewhat those of the Eskimoes and the Palaeasiatics, and all of them are clearly branches of one and the same stock. There is much in the superstition of the Labrador Indians which can be found practically similar among, for example, the Skolts in Petsamo.

Knowing all this one has more practical thoughts of a bizarre action which has been in use among the Naskaupee until quite late, namely that the old and incapable, and troublesome cripples, who could not contribute to procuring food for the tribe were simply got rid of: they were often at their own request abandoned at the camp when the clan moved on, sometimes tied together like a bundle with babiche. The condemned wretches soon starved or froze to death, after which beasts of prey took care to dispose of the corpses. It was considered right that a son, a brother, or a close friend should carry out this execution, and one must do them the justice to say that the parent himself expresses a wish to depart; otherwise the unnatural deed would probably never have been committed, for they in general treat the old people with much care and tenderness.

This horrid practice shocked the white population. If, however, we consider that according to the Indians the spirit is indestructible, death only means that it has the possibility of exchanging a worse for a better material guise. Thus this action was really considered one of love by the Indians themselves. The son generally performed this kind office for his father; and, it having been a practice among them, they wonder at our considering it an act of inhumanity, CURTIS says (196). Perhaps, too, this was a happier death for the suffering old incapables who placed the honour of the hunter higher than the shame of sitting with the women in the tent while the others followed the caribou. — The Naskaupee considered that lighting flashed when an old man's or woman's spirit left its material covering; *tci'bän'is kwrte'u* = death-fire (WAUGH). The Northern Lights signify that the dancing spirits of the dead are holding their nightly revels.

BRYANT was informed at the end of last century by one who had spent two years at Fort Chimo that a custom of killing the aged and helpless still prevailed among the Naskaupee. It is now considered improbable that the Indians, as little as the Eskimoes, get rid of their old people.

— For most of these ideas and customs I have found confirmation in the writings of SPECK, to-day the best scientific expert of the Labrador Indians' non-material culture, and the reader is referred to them (see bibliography) for more detailed information.

Reasons of the primitiveness.

This curiously primitive society of the Naskaupee presents a positive uniformity in the conviction of the nearness and the potency of supernatural powers (606). Hind stated that it has become quite an axiom for everybody who knows them that it may be impossible to wean them from their belief and the wild excitement of a life in the woods. They care for no other pursuit than fishing and hunting, they live and die on their hunting grounds, with no inclination to rise in the scale of civilization (522, 1049). They feel no need of any other life, and nature favours it, and they will certainly continue their old-time ways and their migrations if no outward cause prevents them (cf. 1049).

As far as I know few positive measures have been taken to assist the northern Naskaupee in assuming modern civilization; — cf. e.g. 1082 a. I have no knowledge that a single Indian of Newfoundland-Labrador has been given an opportunity to learn to read, write and count. In social and religious respects the Indians have been but little raised above their state of development at the time when the Catholic Mission first discovered them. Animism is still said to control their view of life. But when their world is so poor as the deserted woods and barren grounds of Labrador it is only natural that they should seek to reinsure themselves where they may find sympathy and protection, so they do not despise what the priest may be able to give them and their families by reading the Latin mass and giving them alms at the trading-post of Davis Inlet. Though really their mental life still belongs to the Stone Age.

The recent metamorphosis among the Naskaupee.

It has been said that the Naskaupee are probably the most isolated Indians in North America. Yet certain changes have taken place during the last half century both in their material and non-material culture. At the beginning of the century they seem to have lived in a curious age of mixed metal, bone and stone. They were still using on their spears and arrows points of hornstonelike calcedon, or of caribou bone or antler.

Stone implements are nowadays restricted to hand mauls for breaking caribou bones and pounding meat, net sinkers and whetstones and the stone tobacco-pipes. Even before the end of last century new tools, new clothing for the bodies, new weapons, new foods, new drinks and new ideas and ideals began to make their way among them. The metal tools, axe, and pot were infinitely superior to those of stone. However, their specific Indian tools and equipment are, of course, unchanged and still in use. There has been



Fig. 288. Dancing Naskaupee Indian. Photograph of a model in natural size presented by Prof. FRANK G. SPECK to the National Museum in Copenhagen. The garments are original and made of white chamois leather painted with patterns in red and blue. The ornaments are so skilfully elaborated that it is difficult to imagine they were originated in the Naskaupee's present environment.

no change in the canoe, the snow-shoes and the toboggan, simply because these means of transport cannot be surpassed in those natural surroundings. The man-high bow and arrows are still used when ammunition is lacking; the Naskaupees are considered splendid bow-men. The crooked knife is still in common use; also the gill-nets both of twine and habiche, and the bone-pointed fish-hooks, like the snares and fall-traps. The shaking-tent (*gocaba'tcige'nc*) and the drum (*devenigan*) are still used in conjuring for luck in hunting and fishing. The sweat lodge, crescent in shape, is much used.



Fig. 289. Costume of a Naskaupee woman in olden days in the collection of the National Museum in Copenhagen. Dress and cap are of white chamois painted in red and blue.

Yet if a cultural loan has been economically advantageous they have not hesitated to adopt it. The winter dress consisted a century ago (610) of a jacket of deer-skin, worn with the hair next to the body, and a coat of the same material reaching to the knees, with the hair outside. Leather breeches, leggings and moccasins protected the lower extremities and the hands and arms were shielded from the intense cold by gloves and gauntlets reaching as far as the elbows. When in full dress, they wore a cap richly ornamented with the claws of the bear and the eagle. The garments of the women consisted of a square piece of dressed deer-skin fastened round the body with a belt and suspended from the shoulders by means of straps, a leather jacket, leggings and moccasins; cf. Figs 288 and 289.

Clothing among the Naskaupee has nowadays quite a large percentage of European styles (coats, trousers, shirts, underclothing, socks and stockings, skirts, blouses and sweaters). Foods have evidently changed considerably, too, since CABOT and WALLACE visited the Naskaupees. The Indians whom WAUGH visited considered flour a necessity and sugar came close to the same category; also baking-powder and salt. Coffee is used, also molasses and canned goods of various kinds.

Owing to geographical conditions these Indians have meanwhile remained untouched by outside influence to a degree that can hardly be paralleled elsewhere in the American Arctic (871). For them there has been but one source of contact borrowing open for consideration and that is with the Es-

kimoes of Labrador and those of Hudson Bay. It is therefore most interesting to find how much the Naskaupee have borrowed from the Eskimo. Some of them have procured draught dogs. STRONG says that at that time the Davis Inlet and Barren Ground people used a few Eskimo dogs, which were harnessed to the sled in fan-shaped formations, but this art, like the *komatik* with runners, was only acquired from the coastal Eskimo some fifty odd years ago. Prior to that the men pulled their own toboggans, and the small white Indian dog was only used for hunting small game. These dogs are now almost extinct.



Fig. 290. Naskaupee youngsters paddling their canoe with the speed of the ordinary motor-boat. Photo the author, July 1937.

The Eskimo 'dickie' is very largely used by the Naskaupee, particularly the outer calico wind-breaker variety, which is worn over the caribou-skin coat, although the latter hangs some distance below it. The Eskimo skin boots are also worn, especially in the wet season, WAUGH stated in the 1920's.

Some of the bone articles among Montagnais-Naskaupee are also Eskimo tools, imitated by Indian workmen (871), and the Naskaupee women's knives, *cagwigan,* are just the *ulo* of the Eskimo women which they seem to have borrowed quite lately (p. 529). These facts illustrate the conservatism or receptiveness of the Naskaupee community to new stimuli.

After the death of *Ostanitsu* — the clan chief of the Barren Ground band in the beginning of the current century, known and esteemed by all — the

communistic order of former days was broken up. He must have been an extraordinarily estimable, affectionate and clever old man from what the Rev. Paul Hettasch told me; he could hold the people together and arrange things for their best. Since then no new man has arisen with developed intelligence and the gift of leadership; his son Charlie, who succeeded him, died young. The band then could not agree as to where each should hunt, and split into small parties of five or six families; it was easy to differentiate between them at the trading station, the Rev. Hettasch told me, for the tents disappeared in groups even as they had made their appearance. There was, of course, a leader in each party who called himself chief but his authority and influence did not at all correspond with that of the old-time chiefs. Strong (909) explains that the chieftainship became of little importance and was usually vested in the oldest and wisest elderly man of the party, but his authority was rather nominal.

Communal hunting had to be given up when the great caribou herds took up new, unknown migratory routes. Finally even the smaller herds of 75—150 beasts, who some decades ago used to keep to certain areas near the coast, disappeared; the people then spread out over the district in small parties. It was better to hunt up groups of two or three caribous in small parties. Trapping, of course, profited by this development, but whether it was fortunate for the Indians, as I judge, time alone can prove. The material culture of the Indians is sufficiently elastic to make the adjustments necessary to prevent chaos resulting, I think; cf. p. 653.

These Naskaupee have finally become christianized to a greater or less degree according to the meaning attached to the term by members of different denominations (435). It is said that Roman Catholicism has made little headway; they are so off the beaten track that they seldom or never hear or see anything of a priest. Yet in their spiritual anguish an apostle arose: old Chien, a Montagnais who had married into the band, began to perform the different ceremonies — of marriage and burial etc. — according to the Roman Catholic ritual. Chien seems to have been a blessing, and according to what I heard from a white man who had had much contact with these Naskaupee, this century has seen great improvement among them. Moral precepts have become stricter; all miscegenation with the whites has ceased; cross-cousin marriage is considered most correct and is urged on the younger people by their elders; no illegitimate children are said to be born. My informer said that also the health conditions of the clan were perfect. They seldom go hungry nowadays for there is plenty of meat and trout for the people in the small groups, he said. They manage, however, better without the white man's food, which is

clear from the fact that the traders at Voicey's Bay notice the Indians are in better condition when they arrive there in May than when they depart in June; and nowadays they buy only a two-weeks supply of flour as a reserve. Another striking circumstance is that the younger men are more moderate in their consumption of beer than the older.

Yet it cannot be said, as it is by some observers, that the old rites and customs have been given up. In support of this the poor development of the symbols in their applied art has been cited; further that art is considered (1002, 909) as almost entirely for purposes of decoration, not for magical purposes. From my conversations with the local representatives of the Hudson's Bay Company I have, however, got a somewhat different impression of this matter; the decorations of the hunting gear for instance, were interpreted for me as having a decidedly magical purpose.

It thus appears that the Naskaupees' way of living is gradually coming to resemble that which we have learned to know among the present-day Montagnais; some experts even hold that there is practically no difference between the two. It is undeniably surprising to find that tundra Indians compelled to live in the forests have spontaneously adopted habits suitable for the new environment (cf. 1049). From this it is clear that under primitive conditions the demand of the environment is a stronger incentive than tradition. This ethnological convergence is an interesting circumstance which the administration can build upon.

The recent development amongst the descendants of the Barren Ground Naskaupee should thus give a more optimistic aspect of the future of this little Indian group than that suggested by CABOT in the beginning of our century. He then believed he had found some symptoms of a decline in social matters amongst them. They were becoming increasingly dependent on the goods of the whites, and in the absence of trade competition this might gradually bring them under the control of a more or less monopoly business and reduce them to a kind of economic serfdom by a gradual shifting to the trader's advantage of the relation between the purchasing-price of the Indian's goods and the sellingprice of the store goods; — which would have struck a blow at the heart of the problem of the Indians' conservation (cf. however 811).

The Indians of Newfoundland-Labrador represent a very primitive and perhaps deculturised stage of Algonkian culture.

Simplicity and primitiveness are the most salient features of the whole Indian culture of Newfoundland-Labrador. Moreover the Algonkian of the far north-east compared with other Algonkian groups show an early phase of the culture of their own stock, a fundamental, archaic, interior culture, very old, SPECK has pointed out (871). By force of economic circumstances due to climatic and geographical conditions it seems safe to say that no other type of culture can have existed on the far north shore than that possessed by the Eskimo along the coasts and the Indians who occupy the adjacent inland region today.

Now, there arises the question, is the hunting culture of the Indians an endemic form of culture stabilized by convergence, that is an autochthonous culture, or must one assume that it came into existence by a process of disaggregation and deculturisation from a more elaborated cultural stage? Let us review these alternatives.

As I became better acquainted with the cultural conditions, both present and former, of the Labrador aborigines, it surprised me very much to find so many fundamental resemblances to or corresponding features of, for example, the culture of the Fennoscandian Lapps. In the old (Iron Age) culture of the coastal Lapps on the one hand and of the Eskimo on the other, as well as in the inland culture of the half-nomadic forest Lapps and for instance the Naskaupee Indians, certain elements and not least some ideas in the sphere of non-material culture clearly indicate that a common root or roots must have existed between the primitive cultures of Fennoscandia and Labrador. Is that agreement due to culture inheritance or to convergence?

Everywhere in surveying Indian culture in the far north, SPECK has pointed out, one encounters the adaptation to internal winter conditions: the dependence upon large game animals, the hunting on snowshoes or skis, the game-drive, trapping for fur clothing, fishing with a spear and by nets, portable shelters, the necessity for complete body-clothing, the dependence upon wood-fires for heat and cooking, the necessity for adequate means of transportation in summer and winter, canoe, hauling sledge, snowshoe and reindeer or dog transport. The simple family group, the absence of political cohesion, the fundamentality of the family hunting district, the weakness of the power of the chiefs, and the unpracticability of large and prolonged religious festivities together with the corresponding development of individualism, all seem to set the peoples of northern Eurasia and America apart from other groups with a

clearness which justly entitles them to rank as one of the typical world-marginal culture types emphasized recently by anthropologists.

If the huge areas where these resemblances can be traced are considered, the first inclination is to urge in explanation the process of convergence: to adapt oneself to the living conditions of the milieu is more and more imperative the farther north a hunting people lives.

As a possible explanation of conditions in the far north-east SPECK (871) figures that the simplicity of the culture exponents are together the ear-marks of a long period of existence in the country of an archaic, sedentary culture of a relatively unaffected old Algonkian type. This reasoning seems to presuppose, as there is some reason to do, that the migration into the eastern area must be pushed back to a very early period.

We have seen that in historical times the Naskaupee have been forced farther towards the north (p. 581) and the Montagnais have followed in their tracks. It is probable that also other Indians have earlier moved towards north-east Labrador in diffuse waves. It seems to SPECK that the drift in older times has been always eastward, and there has been no outlet for a back-flow of either culture or people toward the west. Meanwhile, the natives did not increase in numbers; because of the rigours of the environment a balance may have been reached, the natives' ingenuity could not overcome the unresponsiveness of barren nature by such inventions as would have enabled them to exploit the resources more fully. The rather marked uniformity in many respects among the Montagnais and the Naskaupee may be taken as evidence of a more recent dispersion from earlier centres. The many references to southern animals — mere names to these people — and other contents of the myths in which reference is made to such things as palisaded villages suggest a rather recent northerly movement from a happier country. When the country was inhabited by a new folk wave the invaders perhaps met a more elementary type of culture, normal for those parts, as a function of the poorer geographical environment. They were compelled to adapt their ways of living to it. When the displacement of a group of people with a certain type of culture takes place to a poorer environment, I believe that we must assume a process of deculturisation to be normal. In the present case it progresses gradually with the migration north-eastward.

At least in historical times the changes in inherited culture led to a degeneration in the new areas. In the new surroundings it lacked both justification and possibilities, and many of its elements had to be given up as the people adapted themselves to the new limited possibilities and demands. Perhaps

these Indians have to some extent degenerated mentally too in their new milieu. Certainly their ideas are not able to rise above the primitive interests of the hunter. The beautiful national dress, the long white chamois coat with its artistically painted decorations in red and blue, the white skin leggings and fine beaded white moccasins as well as the head-band have all gone the same way as the artistic stone tools. Symbolism in the old ornamentation is mostly forgotten, but its artistic expression bears witness perhaps to a native cultural development of a long period in a more hospitable area than their present one, where it will be completely abandoned. The mythology of the easterly Naskaupee, says STRONG (909), forms an interesting link between that collected by TURNER in the north and by SPECK in the south (869, 877). It is therefore probable that the deculturisation advanced gradually towards the north. The fact that Indian place names, especially towards the coast, seem to be comparatively scarce, while they use Eskimo or white names for rivers etc., also favours the suggestion that the deculturisation is of fairly recent date. I suppose that every invasion was followed by a deculturisation process in the new area. This being the case the primitiveness of the Naskaupee must be a secondary one.

I therefore think there is good reason to agree with STRONG's conception (909) of these Naskaupee, which at the same time seems to hold good for the Montagnais, that considering their lack of, or poor symbolism, their simple material culture, and their unique religion based on the caribou god, it would appear that the north-eastern Naskaupee represent a very simple and presumably old type of Algonkian culture. Pushed into the barren region where they now live, they abandoned their earlier higher customs and adhered to the old primitive cultural survivals; only slightly have they been influenced by the coastal Eskimo and the whites in recent times.

The thought was not strange to SPECK that the primitiveness of culture can have come about through recession from a more complex phase of culture under which these tribes had previously lived. But after more mature consideration he concluded that the likelihood of the eastern migration of the Algonkian is not a strong objection in this case, because at an early time it would have served to remove part of the primary Algonkian group from the reign of outside cultural influence, leaving this division as the conservator of the original simple culture by reason of its self-isolation. The north-east can therefore be considered as an archaic, marginal, culture zone, where human groups have resided for a long time apart from cultural changes and innovations in a cold and inhospitable country removed from outside contact by reason of its continental terminal position and distance. The natives of the

north-east may have followed the same mode of existence for a very lengthy period, adjusted to the requirements of a far northern existence and clinging to the habitat of the caribou, the beaver, the seal and the bear, the canoe, and the long semi-arctic winter (871). The newcomers became assimilated into that culture.

The development of culture consists of a series of complex processes. It moves over the world quite independent of distance and the ethnic composition of the peoples. Some people die out and every trace of them disappears, but their culture spreads and the development continues hand in hand with it. It can be difficult to prove the connections in the broken links of the cultural chain if only the ethnological characteristics are considered. But here we come upon questions which not only fall outside the scope of this work, but also can only be answered when a systematic, archæological exploration of Labrador has been carried out. —

The white people.

The settled population of today: Subdivisions.

There was hardly any noticeable white population in Newfoundland-Labrador before the end of the 18th century (920 c). The first efforts to establish permanently inhabited trading- posts here were made by the British captain Cartwright (134, 135, 137, 949). His start was rather successful; his establishments, e.g. the Caribou Castle at Sandwich Bay, seem to have been able to export a lot of fish and furs to England. Unfortunately the piracy during the Anglo-American conflict harmed Cartwright and he went home to England. When conditions became peaceful again white men began to settle on the ruins of Cartwright's enterprise in the southern part of the coast. During the 19th century the white population gradually spread their habitat all along the coast up to Hebron in the north but not beyond it, if the Hudson's Bay Company's posts are excepted, the personnel of which do not live directly upon the products of the land and sea. Yet their increase at the coast has been very slow, as appears from the round figures given on p. 439; these include also Eskimoes, Indians, passing traders, missionaries, doctors and their families, etc., but shew approximately the main variations in the numbers of the settled inhabitants. In Fig. 210 the settled population has been plotted according to the census of 1935 (222).

The earliest white pioneers were fur-traders whose interests were the opposite of those of a settled population. They had no permanent stake in the country. Few of them, if any, had brought wives with them, and none of them thought of cultivating the soil. They were a floating population (510) and probably for the most part disappeared by assimilation amongst the Indians.

It may be said that the varying supplies of cod and salmon, fur-bearing animals, seal and whale are still the main support of the permanent white population of Labrador.

The semi-settled fishing population soon found it economically advantageous to combine with their own the occupations of the aborigines — the caribou-hunting and fur-trapping of the Indians and the sealing and hunting of the Eskimoes. This combination required however a semi-nomadic life: the Eskimo life in summer at the coast and the Indian occupations in winter in the hinterland forests. In that way they laid a secure foundation for their permanent existence. We shall later see that quite early a certain adaptation to their milieu too can be traced; thus those who settled on the outer edge of the sea obtained their chief livelihood by sealing and fishing, those who settled in the wooded bays turned chiefly to hunting and trapping.

I have only been able to obtain a vague picture of the life of these people in former times. At present there is all through the district a tendency to form two specialised types: T r a p p e r s, whose subsistence depends almost exclusively on the catching of fur-bearing animals and who have only one fixed home, and L i v e y e r e s, the chief sources of whose livelihood are fishing and seal-hunting, but who also engage in trapping, and who yearly migrate between two dwellings. Yet no clear-cut line of demarcation is possible between the two categories; there are scarcely any who are purely fishers or purely trappers, for the most important occupation is determined by local resources and the opportunities to exploit them. The energetic trappers of Dove Brook in Sandwich Bay (p. 721) could just as well be termed liveyeres. In winter they are purely trappers, but from the end of the trapping season till its beginning in autumn they follow the typical occupation of a liveyere. Yet I have retained this classification in order to present more clearly the variations between the two types.

Trappers.

It is perhaps surprising that in the limitless forest lands, which for example between Indian Harbour and Lake Ashuanipi extend for some 700 km, it is

scarcely possible to find any large area which is not visited and exploited in winter by trappers, white or coloured. Moreover, it is not the fortuitous hunting of wandering people, but a planned and stabilised trapping. For centuries the fur-bearing animals of the boreal forest belt have attracted men to set their traps there: the marten, mink, otter, beaver, weasel, ermine, musk-rat, lynx, some bears and foxes, both the valuable silver and black as well as the ordinary. There too the furs of Labrador are considered amongst the finest in the world, their closeness and softness being due to the low winter temperature. The trapper's income varies naturally with the quality of the skins, but is usually good, and therefore a great number of them have established themselves in Labrador. The skins are most beautiful at the end of October and that is when energetic trappers ought to be on their land. According to its distance from their summer homes the end of September or beginning of October sees them moving along the watercourses to the wilderness.

At the Straits of Belle Isle the trappers start from the river mouths in autumn towards the river sources, in the same way as the dwellers by the rivers St. Mary, St. Lewis, Alexis, and George, and those who inhabit the small gulfs towards the north up to Cartwright. The trapping-lands of the Dove Brook trappers stretch from Sandwich Bay up to some 80 miles inland along the valleys of the White Bear and the Eagle Rivers, and in the valley of the Paradise River they reach as far as the water divide towards the Alexis River. The men who live at the upper end of Lake Melville, again, have several hundreds of miles to go; while those in the Makkovik and Hopedale district have no more than 70 or 80 miles. These variations in distance of course modify somewhat the customs and habits of the different groups (70, 645, 717, 910, 993).

As an extreme example we shall first take the trappers who travel the greatest distance and have their lands within the Lake Melville water system; they generally go under the name:

North West River or Grand River Trappers.

A tacit agreement has developed with regard to individual rights to use certain f u r-p a t h s, i.e. certain stretches in the forests where a trapper may lay out his traps to the exclusion of all others.

Principles of custom for trapping.

When a man goes up the river beyond an established fur-path he builds a 'tilt' (blockhouse) in a suitable spot and sets out his traps, and from henceforth the ground is his and his descendants'. Trapping-paths are thus handed down from father to son. Here custom raised an invincible barrier to theft of property or indiscriminate trapping (1123). In some cases paths are rented by the season to trappers outside the family by tacit consent; the owner then generally supples the 'tenant' with a canoe, a tent and a stove and in exchange receives a third of the catch obtained. This custom fits into the interesting conditions of inheritance among the whites of the area. The youngest son, at least among the North West River trappers, is the general heir; the elder sons usually marry early, have already their own households and have laid out their own fur-paths, while the youngest still lives with his parents. When they grow old it is he who looks after them and does the heavy work, fetches wood, runs the nets and so on. Even after he marries the youngest son usually remains at home and continues to care for the old people. In these conditions it is quite natural that he in return inherits their house, traps, nets, motor-boat, guns, and trapping-ground. — It is interesting to find here the same inheritance arrangements, in essentials, as among the semi-nomadic forest Lapps in Petsamo.

Individual trapping-grounds and their tenants in 1937.

On the map, Fig. 253, I have marked the different trapping-grounds according to information given me by the trappers themselves who even helped to draw them on my excursion map; my gratitude for this is chiefly due to Henry Blake, Murdock McLean, Graham Blake and Jorden Goudie.

The numbers of trappers in the different areas are given below; cf. the map:

I. Grand River district:

1. Robert Michelin — Traverspine.
2. Carl Hope — Muskrat Falls.
3. Stuart Michelin — Sandbanks.
4. Charlie Graves — Porcupine.
5. Joed Blake — Gull Island.
6. Harvey Montague — Horseshoe.
7. Joseph Blake — Blake Waters.
8. Dan Michelin — Mounis.
9. Henry Blake — Mounis Rapids.
10. Gordon Goudie — Lake Winnikapau.
11. James Baikie — Elisabeth River.
12. Dan Campbell — Metchin River.
12. Donald Baikie » »
13. Wilfred Baikie — Goose Cove.
14. Edward Michelin — Big Hill.
15. Arch Goudie — Grand Falls.
16. Jorden Goudie — Flour Lake.
16. Victor Goudie » »
17. Air Best — Gabbro Lake.
18. Cecil Blake } Valley River.
19. Victor Goudie }
20. Ray Blake — Osokmanuan Lake.
21. Francis Tiffani }
22. Walter Blake }
23. Herbert Michelin } Lobstik Lake.
24. Fred Blake }
25. Dick Blake }
26. Henry Baikie } Sandgirt Lake.
27. Fred Goudie }
28. Will Bird }
29. Henry Mesher } Michikamau Lake.
30. Omen Mesher }
31. Donald Baikie } Michin River.
32. Dan Campbell }

II. Kenamu River district:

a. Ross McLean.
». Wallas McLean.
b. John Whity.
c. Irum White.
d. Donald Michelin.
e. Mark Best.
f. Henry Best.
g. Douglas Best.
h. Philip Blake.
i. Alvin Blake.
j. Jim Goudie.

III. Goose Bay district:

k. John Grove.

IV. Goose Bay River district:

1. Robert Best.

V. Grand Lake district:

1. Sid Blake — Caribou River.
2. Willie Baikie — Berry Head.
3. Robert Baikie — White Cockhead.
4. Friman Baikie — Beaver River.
5. John Montague — Red River Monikyn.
6. Colvin Bromfield — Mable Island.
7. Bent Blake — Seal Island.
8. Gordon McLean — Crooked River.
9. Murdoch McLean — Wabustan River.
10. Bent Blake
11. Duncan Blake
12. Herbert Blake
13. Tom Blake

} Seal Lake.

VI. District on north shore of Lake Melville

14. Fred Ritchie — Butter & Snow.
15. John Michelin
16. Edward Michelin
17. Charlie Michelin
18. Gushne Michelin
19. Peter Michelin
20. Hildred Michelin

} Sebashkau.

21. Robert Baikie
22. Tom Baikie
23. Bert Baikie
24. Hugh Campbell
25. Cyril Campbell
26. Glyn Campbell
27. Ramen Campbell

} Mulligan River.

28. Russell Chaulk
29. Byron Chaulk
30. Pierce Chaulk
31. Holam Chaulk

} Pearl River.

32. Peter Shepard
33. Rennel Shepard
34. Bill Shepard

} Valley Bight.

VII. District on south shore of Lake Melville:

35. Sam Bromfield
36. Irum White
37. Jim Gear
38. Math White

VIII. Lake district on the southern water-divide.

39. Reginald Blake
40. Graham Blake
41. Isaac Rich
42. Solomon Seward.

} Minipi Lake.

Perhaps the divisions on the map ought to have been drawn with two lines: one — the trap-line — stretching to the one side, the other on the opposite side of the watercourse and both mainly at right angles to it with deviations due to the terrain. Yet it was impossible to draw these fur-paths exactly with the material available. As no white trapper with any hope of great success would set his traps between the traditional fur-paths, schematic boundaries had to suffice.

The map also shows that the trapping-grounds in the Hamilton and Naskaupee Rivers' system are rather closely covered. The number of traps here is estimated (in 1939) at about 15,000. But within the whole of the Lake Melville system it is considerably greater. To the former must be added the Indians' traps and those of the trappers on the eastern part of Lake Melville, chiefly east of St John Is., in the district of Rigolet and at Backway, both white men's and Eskimoes'. — The Rigolet people set their traps chiefly around Double Mer.

In consequence of the inheritance arrangements already described new land is constantly being taken up for trapping as the population increases. The men of Lake Melville system — when excluded from the grounds in the east by the Hopedale and Rigolet trappers — tried to extend northward, towards Davis Inlet for example. But this has not been successful; the country

is mostly treeless, only along the watercourses are there densely wooded tracts, some miles in breadth, and in them the most valuable fur animals — the marten and the beaver — are rare or whole absent; so these trappers returned to the Lake Melville drainage area (187). Since then the chief expansion has been westward.

Thus the trapping-grounds are branching ever farther inland from the coast (cf. p. 649 sq.) to areas formerly exclusively Indians'. The grounds are becoming more and more covered with traps. From place names it appears that the Indians in bygone days spread their hunting as far as to the coast.

Valley trappers and Height of Landers.

The Hamilton River trappers usually divide themselves into two groups: valley trappers and Height of Landers (= the trappers working near the water-divide in the west). The boundary between the two lies at the Big Hill Portage where the Grand Falls must be avoided. This portage rises steeply 700 feet in a quarter of a mile, and here the deep part of the valley is left behind in reaching the Lake Plateau. According to information I received the trappers had scarcely any grounds on the Lake Plateau at the turn of last century. Attempts were made to take up land there for trapping, but the Indians destroyed the traps and burned up the blockhuts (644). Since then the white population has rapidly increased and it has been absolutely necessary to extend their trapping-grounds also on the Lake Plateau. Only some small remnants of the great-family areas of the Montagnais Indians (p. 637) are still used by the Indians. But not even those are recognised by the other Indians or the whites as inherited Indian family grounds from which new comers are excluded (cf. p. 634 sq.).

As is seen from the map the Indians are practically excluded from the largest valleys and are now compelled to seek their livelihood on trapping-grounds of second quality. It could be presumed that many conflicts, fights, and arson would result from this, as has happened in other places where aborigines and invaders have met in competition for the same districts. Yet here the Indians demonstrated their disapproval and indignation by setting their traps alongside of the trappers' fur-paths, as Mathieu André did beside Fred Goudie's at the beginning of November 1930 (644), to the disadvantage of both. I was also told that sometimes outraged trappers have marched, loaded rifle in hand, to reclaim their »stolen furs» (731). But no continued, serious conflicts have occurred. Many among the trappers I talked with about this matter could speak the Indian language as well as the Indians them-



Fig. 291. Looking northwest over the North West River village. The river of the same name here at its mouth in Lake Melville crosses a marginal moraine. Photo E. H. Kranck, July 1937.

selves and seemed to have had the most friendly relations with them since childhood. It is indicative that when the Indians visit the white communities they generally settle down beside the house of a good white friend, whom they call an »old chief», and usually ask his advice on all possible questions concerning the mysteries of the new civilisation. There is friendship between them.

As already indicated our map illustrates a cultural-historical event which appears to have general validity for the primeval forest areas of the subarctic: the districts of the small groups of aborigines become gradually surrounded by the white men as they spread out, and then by mass effect are either assimilated or exterminated (cf. p. 649 sqqq.).

Fixed dwellings.

All the Grand River trappers have only one fixed dwelling and around this the different phases of their life circle. Most of the trappers live in small, neat villages. At the eastern end of Lake Melville there are three: North West River — Figs 291

and 292 — at the outflow of Grand Lake, Mud Lake half-a-mile from the mouth of Hamilton River with 10—12 weather-worn houses, a little white church and a cemetery, and the third little community has arisen in Mulligan on the north-west shore of Lake Melville. However, some trappers still prefer to live alone in the wilds. For instance Fig. 293 shows John Grove's fine house surrounded by primeval spruce woods on the outer edge of



Fig. 292. Looking from the east over a part of the North West River village. To the right from the wharf is the Hudson's Bay Company's complex, to the left Int. Grenfell Association's hospital and school and private houses. In the lower corner to the right the football ground, from here obliquely to the forest the doctor's house and from thence obliquely to the right in the forest the Church of England church. Most of the private houses are outside the picture. The number of inhabitants is about 250. Aerophoto of the author, Aug. 3rd. 1937.

the delta which the Goose River has laid down in Goose Bay. His nearest neighbour is his brother, whose house lies some miles farther into the delta on an arm of the river, but his other neighbours are about ten miles away. Carl Hope's house lies twenty-five miles up the Hamilton River, at the tide limit like an outpost towards the wilderness. These small centres of European civilisation present many surprises, both great and small.

North West River offers a delightful view from a distance, its white painted houses with red (= Hudson Bay Company's buildings) or black roofs (= trapper dwellings) standing out so beautifully against the background of the

spruce forest. The village makes one think of a neat little Danish bathing resort, though the spontaneous orderliness of the village planning, Fig. 292, is different. In North West River the population live in the most intimate contact with two important disseminators of culture in Labrador: Hudson's Bay Company and the International Grenfell Association, and the community clearly reflects their good advice and instruction. The walk along the shore at North West River is dominated in the centre by the Hudson's Bay Company's complex (the managers' houses, the houses of the staff, the shop, workshop, storehouse etc.), not far off to the east are the Grenfell Association's buildings (hospital, school, doctor's house, workshops, etc.). Beside them lie the trappers' well-built, white-painted homes. I have had the pleasure of being a guest in some of these last, both old and new, and the interiors made the same impression on me as beautiful miniatures; I shall always remember the atmosphere of warm, dignified intimacy which prevailed there.

Journey up the river.

Let us now devote some attention to the occupation of the trappers. Thanks to the accounts of my trapper friends and Merrick's captivating descriptions I have a rather good idea of the life of the trapper within the otherwise locked doors of the wilderness. Here fur-skins are the only source of income. It may therefore be considered that the cycle of their livelihood begins when in autumn they travel up to their trapping-grounds. We shall now accompany the North West River trappers on their journey.

Those whose fur paths lie farthest in the interior start first. It has become the custom for these so-called Height-of-Landers to begin to move to the Lake Plateau on 10th September for the w i n t e r h u n t. The lazy days of summer are as if blown away, energy has returned, will and muscles are on the stretch. Laughing and joking a little flotilla of about thirty canoes make their way from the North West River village. Most of the trappers have a canoe each, but it sometimes happens that two men find room for their equipment and food in the same one. After the flotilla has started those left behind generally let off shots into the air as long as the boats remain in sight; — just as was the custom in Lapland only some decades ago. The departure is an important event, for the separation lasts for months.

The journey up the river, with alternate paddling, poling, and tracking from dawn till dusk, is made in all haste, for some of the men must travel more than three hundred miles. But the speed varies with the weather; in

the large slack waters the flotilla may be obliged to lie by the wind and it is therefore necessary to hurry in between if one is to arrive at the destination before the trapping has to begin. If a canoe gets a little hole from grazing a stone, a little butter or lard is smeared over it, and this will harden in the cold river and keep the water out till evening when it can be properly repaired. The only long rests are taken at the portages, for there depots of food are set up for the return journey. Day after day, week after week they



Fig. 293. The trapper John Grove's house in Goose Bay, Lake Melville. In the house there is in splendid order; the men have to work in the porch with their furs, dog harness, carpentry etc. etc. and there they hang up their wet clothes to dry. The primeval forest reaches to the house; no garden plots exist. Photo the author, 1937

continue alternately paddling, poling, and carrying their canoes until finally after a month the trapping-grounds are reached; Jorden Goudie (cf. p. 703) reckons that on the average it takes a month to get to his fur- path at Flour Lake from North West River.

Trapping and life on the trapping-grounds.

On the grounds the trapper has built himself a tilt; there he instals himself with all his stores while the canoe is laid up on a scaffold somewhere near and covered with spruce branches. Those trappers who stay on their grounds all the winter and only return by canoe when the rivers melt again have con-

siderable stores in their little houses. The tilts are of different kinds, some with a floor, some without, windows are rather uncertain, the main thing is a good iron stove. Thin and draughty walls are improved very simply by pouring some pails of water over them, this will freeze up every crack. It is said that a tilt here will last fifty years. Some are nearly as small as a kennel.

Some days after the arrival the trapping begins: the fur-skins are darkest in the middle and end of October. Little do the future wearers of the furs in 'Vanity Fair' dream of the hard work that lies behind this industry in Labra-



Fig. 294. Trappers from North West River. To the left Wilfred Baikie, to the right Murdoch McLean. Photo the author, 1937.

dor, how much wet and cold, hunger and hardship a trapper must endure in the wilds so little friendly to mankind, before he succeeds in his efforts! Now the trapper hastens to lay out the traps on his fur-path, work which takes at least a week, for he may have to lay out 200—300 traps on one path, sometimes at every quarter of a mile, sometimes at greater distances (286, 579, 599). As has been said, this is not a path in the ordinary meaning, but a zigzagging, uncleared line, with a row of traps, and for that reason it is called a trap-line. This line must be blazed with an axe at such distances that it is possible to see from one mark to the next; a triangular mark is made in the tree beside each trap in order to find it again after the snow falls. Besides that it is usual to change the positions of the traps at times (cf. 70, 268, 599).

The trapper is no daily wage-earner like the lumber-jack. Even to choose the position of a fur-path in those hundreds of miles of wilderness is a complicated science; it must run over open ground with deep thick woods where the marten thrives, and the darker the woods the darker the skin of the 'Labrador sable'; there must be little streams liked by the beaver, the mink, and the otter, and narrow lakes with open shores and bare land near where the fox wanders. It is said that in the forests the trappers read and understand the tracks in the snow as we read an open book, and he 'lives' the habits of the animals' life. There in the wilds he feels himself the highest of all creation, he knows that he surpasses even the Indians; his catch of fur-skins is always greater than theirs. To lay out traps correctly (579, 644) demands experience and instinct; it is some secret understanding with the spirits of the animals which helps him, some say. It is an art to lay the trap so that the red fox will place his paws on it. It is cold, hard work, especially when traps are to be set for the otter and the beaver, for they must be laid under water and baited with rotten fish. It is said to be good to smear a little beaver castor on the traps, for its smell exercises a magic attraction on all fur animals. — The poisoner-trapper is unknown here.



Fig. 295. Grandmother Montague with her pets. Photo the author, 1939.

A trap-line is usually so long that it takes three days on snowshoes to examine the traps. For this reason the trapper often sets up six or eight small tilts, like big dog kennels, usually built up on four layers of logs, where he can rest after the day's exertions, melt the game and skin it. Thus on a trap-line there is much more to be done than an uninitiated person would think. About four o'clock in the morning he begins his day and can only pitch his camp when twilight has fallen. All day he is seeking and arranging his traps, carrying a sack with the game and the bait. When in the evening he reaches his hut he must make a fire, melt and skin his booty, eat, and bake bread for the next day (for the white man in Labrador does not eat stale bread). When everything is in order for the next day it is often past eleven or midnight. The cold often wakes him in the night, and once or twice he must get up and put wood on the stove, the fire is his guard. If he neglects to chop

wood in the evening for his stove he may freeze to death in his sleep, as did John Pardy's brother. On the fur-paths the trappers carry neither blanket nor sleeping-bag, for the sack with his game is heavy enough. 'Tender in the body as a boiled fish' he gets up in the morning many a time conscious that he must 'get going' — 'just for badness' as he says —, he can rest on Sunday. With the swish, swish of the snowshoes he repeats 'I am not tired, I'm not hungry, I'm steel' (645). A lazy worm would soon be below the mark here, but the Labrador trapper can live this life; he is so trained and hardened that an endurance test is said to be a daily event for him. The wilderness is grim and heartless in its desolation but it obeys him, it rewards him, he has become its undisputed ruler, says MERRICK.



Fig. 296. The trapper family Henry Baikie from Mulligan, Lake Melville. Photo the author, 1937.

Trapping is both an occupation and an art, and to learn it the Labrador trapper must begin school early. And fine speciments of manhood do we find here! cf. Figs. 294—296. Ewert Michelin already as a ten-year-old boy kept his family supplied with fresh hare and ptarmigan all through the winter; he had snowshoes, his own gun and axe, a big dog and a little sledge with which he fixed and visited his traps and snares. At thirteen years of age Lawrence Hope was a good hunter. Bert Blake began his trapping in the wilds when he was twelve, Harvey and Cecil Goudie were ten and thirteen when they made their first journey up the Grand River to the trapping-grounds, and my guide, Henry Baikie began his journeys on the Grand River just about as early; already as a boy he knew every dangerous rock and eddy in that river, more than 500 km long. John Michelin was fourteen when he started out alone to his fur-path in the wilds. John Pottle was trapping alone at the age of seventeen. Russel Grove was nineteen when he started for himself in a previously unknown part a new fur-path 300 miles from home (644).

It is possible any day to see little children five or six years old shooting from canoes on the water with their own express rifles WATKINS wrote (1000). At first

father and sons generally go trapping together, boys from eleven to fifteen, so that under good direction they shall be initiated into all the mysteries of the calling. When a boy is fifteen he is considered a *man* in Labrador. The result of this training is that an accident or a death occurs only extremely rarely in the wilderness (see further MERRICK, passim). 'Reading books is no good if you've got nothing to eat' the father teaches his son. But the same father himself teaches his boy to read, write and draw. There are no illiterates among the trappers. But there are indeed some calligraphists whom I think a lithographic institute would at any time welcome to their service.

This life in the wilds compels of course early selection, and most of the Labrador trappers who survive are prodigiously hardened and powerful. On his seventy-fifth birthday Joe Michelin went for a little walk of 36.2 kilometres from Traverspine to North West River. At the age of 93 years it is said that he also trapped a little, keeping more or less close to home. The fever of the wilds continued to burn in his veins, snowshoes, guns, canoes and boats played a more important role in his life than did the comforts of home. Unfortunately he was susceptible to the seeds of epidemic diseases.

It is said that there are many kinds of animals in our Lord's paddock; there are also many kind of trappers. What I say here gives essentially my own impressions of those with whom I had the pleasure of associating, and what they so convincingly related of their lives. It is scarcely possible that many Indians know the life in the wilderness better than these trappers, its charm, attraction, and dangers, and the ways of controlling it. In the modern sport of orientation the trapper would carry off the prize both on sea and land; his habits of dealing with the unknown, his ability to find his way in the dark, the fog, and the snowstorm is absolutely miraculous, he always finds the way and it is usually the shortest to the goal. He knows full well that to lose his way would in many cases mean death, one must be resolute and endure. The writer of these words began his own incursions into the wilds before he was ten years old, and for half a century he has met there great hunters and fishers. But never has he had so unbounded a respect for the white man's capability in the wilderness as when he learned to know the white trappers of Labrador. Life among the dangers and difficulties of such a country educates one to courage and resolution and the trappers stood out as both superhuman in ability and artists in life. A trapper could tell like a child of the dragon-fly's dance in hunting the mosquitoes on the sandy beaches and the dance of the hare in a moonlit glade in the spruce forest. But immediately afterwards he could, if necessary, strain nerve and sinew, and his face became as if hewn in stone. He loves his wilderness; I think it was John Michelin who said that he felt more his own master on his fur-path: 'in North West River there are too many people, one can seldom go out without meeting somebody and being obliged to chatter'. When he wanders about the forest quite alone, or lies month after month in his tilt, with no other company than the stars in the sky, the soughing of the trees and the sparks from the stove it is no wonder if he becomes reflective, enquiring and quite otherwise introspective than the people of inhabited districts.

In this way month after month passes on the fur-path. Each man's rights are clearly defined and there is no encroachment. If in the course of his travels a man comes upon another man's trap and there is a fox between the jaws, he will take it out, hang it to a tree close by and then re-set the trap. This practice is strictly followed, not from force or fear but by mutual regard for traditional behaviour. 'Good Custom is better than Law' is the trappers' motto. This is the unwritten law that prevails in the land of the trappers. Woe unto the man who dares to break away from the 'good custom'! The whole body of stern Puritans would turn upon him in righteous indignation, and his trapping days in that district would be cut short. With this state of affairs existing small wonder is it that the trappers instinctively dislike legal injunctions (1123).

To go round his traps usually takes a week it is said, but on the seventh day he rests wherever he is. The North West River trappers are Scottish Presbyterians and therefore always keep the Sabbath. Sometimes visitors come, and charm and intimacy may steal into the soul, and it is as if a closed book opens. The experiences of life unroll as in a film, tales and ghost stories are told and they play cards. As a matter of fact the rules as to what one may or may not do on the Sabbath form a quite complicated dogma among the trappers; see MERRICK.

Journey home.

As Christmas approaches restlessness comes over many of them: the longing for home breaks out: Going home! It sounds as if it was just a little walk, whereas for many it is a tramp of hundreds of kilometres. Some yield to the call about the 20th December, others not until about the 20th January; the store of food seems here to be the deciding factor, but the longing to get back to a young wife can also be overpowering. Yet if his store is sufficient and he can overcome the longing for his cosy house and the family the trapper stays until the ice has left the rivers, for then he can go down by canoe. Yet he is usually forced by lack of food to begin the troublesome journey home on foot as soon as the trapping is at an end, in which case he must trudge back later to fetch his canoe. The cause of his lack of food is often that he has too generously shared his store with needy Indians or other trappers.

The journey home on snowshoes in midwinter is no walk on roses. The trapper packs his skins and his tackle on to a tabanask, and this he himself must drag in all weathers; in a thaw, which is not rare if a cyclone comes and softens the snow, the tabanask can be unbearably heavy on account of its large friction surface. The nearer he gets to his home, the more he hastens;

he can attain even 6.5 kilometres an hour; there have been cases when trappers dragging tabanasks have in 48 hours covered 130 km in completely untrodden land. What I have already said about the confused growth of Labrador's primeval forests should be remembered here (p. 383 sq.).

Journeys in connection with the winter hunting comprise for 'Height-of-Landers' about 600—700 miles in the worst case. As all trappers own a span of husky dogs one is somewhat surprised to hear that they prefer dragging their own heavily laden sledge to taking the dogs to the fur-path. But the dogs would be more trouble than use, they say; they would eat at least one pound of food per day and if one must go hunting to procure them food trapping would become suffering for them as it is for the Indians (p. 651 sq.). Besides this husky dogs, Fig. 297, are born thieves; in an unguarded moment they will swallow all they can get at, 'from mitts and woollen jackets to blood-stained penknives', they soon learn how to get loose, and wander about and steal from the traps. Under these circumstances it is easily understood that the trappers do not care to take the dogs with them. The only animal that I have heard can be trained to be an extraordinarily good help in this work is a cross between the husky dog and the Newfoundland.



Fig. 297. Sledge-dogs on summer vacation (536 a).

There is joy in the village when the trappers return. When most of them are back, usually in the middle of January, there is a real midwinter celebration in North West River, usually lasting three days. People stream thither with their dogs and their children even from Sebashkau, Mulligan and Pearl River, north of Lake Melville, as well as from Goose Bay and Mud Lake south of it. There the old dances — the quadrilles, lancers etc. — are danced in the schoolhouse by girls in fine dresses, and healthy, strong, elegant trappers; Fig. 294. And no one ever gets drunk.

Spring hunt.

In the middle of February, however, the wilderness again calls its faithful children. Muscles swell, snowshoes are strapped on and the trapper starts out on his so-called spring hunt, which usually lasts till the middle of April. Now it is good to have a dog to draw the sledge, and usually a little Indian dog also which sometimes even helps to draw: clothes and other light things are packed into a seal's skin which the little dog can drag. The days now begin to be longer and the small party trudges from 5 in the morning till 8 in the evening, covering often 35 miles in the time! The going is easier since the snow is more closely packed, and in the middle of March, after the midday thaw, the surface hardens. Now the track is fine and one might travel all day. Yet the fur of the animals has become discoloured in the sunshine and the skins are of little value. Therefore also trapping is forbidden by law from the 15th of March; skins taken then are forfeit to the authorities.

At the beginning of April many take advantage of the hardened track to carry special stores up to their main tilts by dog sledge, because if the worst comes to the worst the trapper must rely on his cache of food. When all has been put in order and the work with the tilts and traps is finished the trapper has something better to do than to lie up there and wait for the summer. The canoe is therefore placed on a *catamaran* — a low sledge with broad runners — which the dogs drag home. Not until late in June, when the freshet is over, can one travel down the rivers by canoe.

As can be seen from the above the trapper's life is not an easy one in our eyes; if on the one hand it offers much of real romance and gives him a surprisingly good income in some years, it is on the other hand full of privation and hardship. Many of the white fur hunters in the Hamilton River valley, however, know no other life. And just as hunting attracts them, so does the free, strong life in the wilds where so much happens.

Home duties and home life.

Seal-hunting calls the trapper to the traditional spots between Sandy Run and Green Island where the wealth of seals is great. One haul of the net has been known to give up to 30 of them. North West River trappers have also caught seal at the blow-holes near the ice edge outside Hamilton Inlet, but this is difficult and dangerous, for an old Greenland seal could easily drag the hunter into the depths if he were not on the alert. Like the Eskimo the trappers consider the seal's liver, heart and tongue as delicacies,

the flesh of the young ones is wholesome food; the carcase goes to the dogs. The skin is used for all kinds of clothes, dog's harness, etc. as among the Eskimoes.

I c e-f i s h i n g, too, attracts people in April. In May the ice begins to break up, lanes are formed. Then the migratory birds come back: geese and ducks. Men begin to h u n t f r o m c a n o e s; the hunter generally hides behind a little sail like the seal hunters use in Fennoscandia —, and with this camouflage he resembles so closely one of the ice blocks drifting about in the mirror of blue water that he can easily get very near to his prey.

But also work is waiting that never comes to an end: tree-felling and cutting, which for one family, including its dragging home by dog-sledge or floating in summer, its chopping and stacking, takes at least a month. Without sufficient fuel, they may freeze to death in the coming winter.

We have now come to the s u m m e r. Potatoes, cabbage, and lettuce are planted. Barrels are made and other carpentry is done in the home, salmon is caught for one's own needs, and when the cod begin to approach the coast some families — now however only a few — make their way out to them in Indian Harbour. A decade or two ago it was quite general for the families to move out, bag and baggage, twice or three times in the year, to different parts of the Hamilton Inlet to fish and catch seal. But it was a tiring journey, both men and women had to row their utmost to move against the tide. Now they have decked motorboats when the family moves, which shows that their standard of living is secured. Yet in spite of this cod-fishing has practically ceased.

One possible form of livelihood, on the other hand, is almost wholly neglected by the trappers: cattle-breeding. And yet conditions for this are good in many parts. It is true that a few individual cows have found their way into the community, as in North West River and Kenamish, but there is no question of any real cattle-breeding. We shall return to this matter in another connection.

In the summer many of the h o m e d u t i e s occupy the men.

In daily life the trapper must be able to turn his hand to many things. And as a matter of fact he does them more or less well. He is a carpenter and a wood-chopper, he must saw, do wood-work and cabinet-work; he is a plater, a mason, a boat-builder, a repairer of engines; he sails, he hunts, he fishes, he grows potatoes and other vegetables (lettuce, cabbage, carrots and beetroots). But above all he is a hunter: 'In the woods I'm like boss of the world' a trapper said to MERRICK. Many of them are the equals of the Eskimo in seal-hunting and dog-driving, and many surpass the Indians in skilful trapping and man-

œuvring the canoe in the seething waters. I myself have been convinced that the trappers are first-class seamen in navigating modern vessels out on the open ocean. 'Sometimes it seems as though they had taken for their own the best qualities of the three races, the Eskimo's laughter-loving happiness, the Indian's endurance and uncanny instinct for living off the country, the Scotsman's strength of character and will' says ELLIOT MERRICK after living in North West River for two years, 'I began to feel that these were happier, finer people than we had ever known before. The primitive hard life seems to produce character as civilized existence cannot', he adds. 'There are few finer trappers, probably, in the world', Dr PADDON emphatically exclaims (731). And I heartily endorse his expression of admiration.

Only in a few exceptional cases does a trapper's wife move with her husband up to his trapping-grounds, and then no farther than to Winnikapau Lake in Hamilton River. It is her lot to be the good genius of the home during the trapper's absence and she is a bundle of energy just as much as her husband. She has no one to wait on her when he is away. She brings water from the river and wood from the pile, warms the house, keeps it clean, and polishes the lamps. She looks after the children and washes the family clothes which she then hangs out to dry with snowshoes on her feet. She cleans the fish and plucks the birds, skins the hare and the porcupine; she prepares the food, she bakes, she feeds the dogs. Then she also procures food for the family by shooting ptarmigan and catching hare or ice-fish. She picks berries and makes pies. In the spring she prepares the seals' skins and makes shoes and clothes for the family: sweaters, parkas, moccasins, underclothes, overalls, dickies, etc. It falls to her lot to mend the clothes, but besides that she must make flour-bags, tents, gun-cases and sails for the trapper, and also knot salmon and trout nets (645).

Here life educates the personality; husband and wife are good comrades, happy, healthy people, who make life joyful for each other and their children. In the evening all gather round the crackling fire on the hearth and exchange their thoughts and experiences. The trapper's home is a little heaven on earth, says MERRICK.

In 1915 the young men were called upon to enlist and many made the supreme sacrifice. But many who returned had seen and learnt to know in Europe the most refined life which civilisation there can produce. But all trappers are so attached to their home district that none is willing to desert it when they have reached a mature age. I know only one exception: that is John Grove's son, who is now professor of mathematics at a Technical High School in the States. His father has been called a 'Titan in his own land'. By trapping and some trade he has amassed a fortune considerable even according to American standards, but he continues his trapping. John Grove once took a fancy to move to the United States, but after some years the longing for home was so strong that he could not withstand it. 'Here we are again, and here we shall stay' said his wife to me. There are brains, as well as brawn, to be found north of Belle Isle Straits, Dr PADDON stated with pride (731), and the world will be

the poorer for the passing of the self-reliant and resourceful, long-distance trappers of the Newfoundland Dependency.

I happened to enjoy the hospitality of John Grove and his wife quite unexpectedly. During an excursion in Goose Bay we were surprised by the low tide and our motor-boat was sinking deeper and deeper into the mud while the lashing rain wet us through. John Grove, who heard the ineffective hum of our motor, understood our situation and semaphored to us in the blackness with a flash-light. When we finally got out he welcomed us as guests to his beautiful home which is to be seen in Fig. 293.

The house comprises a porch, kitchen, dining- and drawing-rooms on the lower floor and on the upper floor a sitting-room, four bedrooms, dressing-rooms etc.; one almost waded in the bearskins with which the floors were covered. My host gave me dry underclothes of such fine wool as I had never seen the equal. I spent my night in a splendid bed of which the linen was beautifully embroidered.

All the interior bore witness not only to wealth but also to a cultured home, and I believe that, for example in the circles of the officials of the Old World, one would have to go rather high up in the scale to find a corresponding standard of life. The meals gave the same impression. Breakfast at 6.30 in the morning began with fresh oranges and porridge, then bacon and eggs were served and fried salmon, and the meal finished with coffee, tarts, and orange marmalade.

This was of course a specially wealthy house I had the pleasure of visiting. The normal trapper family's yearly income is said to average about $ 1000 or a little more, and in such a family one can scarcely fill the mouths of the children with oranges brought by airplane, for they are, like everything else in Labrador, very expensive.

Incomes.

The trapper's life can thus be very profitable for those who understand it. In the winter of 1936—37 John Grove earned from his skins $ 7,000, and Wilfred Baikie $ 4,000. It seems to be generally reckoned that on good fur-paths an average income can be obtained of $ 1,000—3,000 in good years. Incomes have risen somewhat since the close time for the beaver stopped in 1936, and trappers may again catch up to eight beavers each every winter. Nowadays it is scarcely possible to count on getting more than one silver fox per winter.

Origin of the trapper communities and how they maintain their standard of life.

The North West River trappers may be thought to represent a cultural paradox. The trappers carry on a purely predatory life. Upon the interior of the country they have set no mark and no crops grow upon their land; they

harvest the wild (761). One would think that in the prolonged isolation in a virgin country, far away from the motherland, the cultural range must have diminished for lack of vivifying contact (cf. 522, 743, 891, 1049).

We know that these people's forefathers were of varied origin.

Montague emigrated from the Orkney Islands when a boy; he had for years followed the life of a' planter'; that is, had engaged in the fisheries during the summer and trapped in the winter, trading with the Hudson's Bay Company and drawing his supplies from them (105).

The older families are, with few exceptions, the descendants of Scottish and English ancestors. Many of these restless spirits came here in the service of the Hudson's Bay Company when it began to set up stations on the coast (Fort Chimo 1831, Rigolet 1833, North West River somewhat later, and others). The Company brought carefully selected people to manage these trading-posts, chiefly from Europe, from England, Scotland and even from Norway. Many of the descendants of the company's managers and clerks as well as others of the staff were so charmed with the free life in the wildernes and found trapping so profitable that after their contract had run out they settled down as independent hunters of fur animals. Some of them married Eskimo women. In some families there is even a mixture of Indian blood. Thus Fred Goudie's paternal grandmother was a full-blooded Cree-Indian. One of the trappers is a half Scot, one quarter Eskimo and one quarter Indian, another is 7/8 English, the rest Eskimo. It is said that the oldest family in North West River is now in its fifth generation.

Now, it might be thought that when married to the natives the immigrants must soon have given up most of the culture to which they had been accustomed, because of transplantation and the inheritance of native patterns and deculturisation (cf. 510). Some *coureurs-des-bois* and the trappers who came from France at the beginning of the European expansion left their women behind. They intermarried with Indians and became used to Indian ways, and the purveyors of the intrusive culture disappeared in the second generation, leaving no survivals. This is, however, not at all the case in North West River. If you go to visit people, for instance on Sunday afternoon, you will find good tone and dignity prevailing in the company, which will transport you into a little centre of old English culture (170). You will find that the people have understood splendidly how to assimilate the different material cultures around them without allowing the Scottish-Presbyterian faith, the old English speech and customs of their white forefathers to deteriorate; just as little have they lost their innate *instinct of white people.* Evidently these traits of old culture were brought out by the trappers who came later and their wives preserved them

with dignity. It is just the woman who intuitively takes responsibility for fidelity to and maintenance of certain traditions (139 a). She tries to make the new life as much as possible like the old. She trains her daughter in loyalty to her wishes and to be able to carry on this life after she is gone, to love her duties, to be conscientious over them and feel pride in them. Without the traditional order, 'o u r w a y', the trapper's wife fears the life would become disgusting like that of the poor savages. Thus the woman as the pivot of family life makes possible the continuance of the old home culture (510).

But of course many impulses for the retaining or the raising of the standard of living have reached this community also from prominent men who have been in the country for some special task. In North West River Lord Strathcona, the Old Grand Man of Canada, and the one who took the initiative for the Canadian Pacific Railway, is one of those who made part of his career there.

Dove Brook Trappers

represent a still more complex type of occupation. We find in their cultural framework two basic patterns amalgamated: the trapping and the hunting of the Indian culture with (superimposed upon?) the seal-hunting and fishing of the Eskimo culture. A good deal of Indian nomenclature has also been retained in the trappers' language. The fact that the way of living here has not developed into a more specialised type, as amongst the North West River trappers, is perhaps due to the geographical conditions in Sandwich Bay which favour the more complex means of livelihood.

Trapping.

During the season, October-March, the Dove Brook trappers are out on their fur-paths. The families remain in Dove Brook and now and then their menfolk come to see them, to leave their furs and supplement their equipment and provisions. These repeated visits are possible because the distance to the trapping-grounds in the valley of the White Bear River is not so great.

When the coats of the animals begin to be bleached by the spring sun the men definitely go home.

Sealing.

Soon after their return the trappers go out to the ice edge along the ocean coast and hunt seal which are necessary for dogs' food among other things;

Fig. 298. In April they also carry supplies by dog teams to the places where they will fish cod in the summer: Paks Harbour or Gready, etc.; Fig. 299. They also catch some fish through the ice of the lakes. In May, when long lanes open up, the water-birds are shot when they return from the south.

Salmon-fishing.

At the beginning of June the families, with their most necessary utensils, move to their fixed salmon-fishing places in the fiord. The salmon pass up in the middle of June or somewhat earlier on their way to the rivers; they are then caught in nets and are a very important source of income. Salmon-fishing in Sandwich Bay is rationalised. The fish is taken fresh from the catch by the Hudson's Bay Company's collecting boat, and in this way is quickly exchanged for cash. As an example of what salmon means for the economic life of Labrador it can be stated that the Hudson's Bay Company in 1937 handled about 1.25 million pounds of it in the south-east part of Labrador. The fish is frozen in Sandwich Bay on a specially equipped 7,000 tons steamer, *Blue Peter*, and then sent to England, where it tastes good in London a month after it was caught in Labrador.



Fig. 298. Trappers on the way to seal-hunting in the spring. Photo Mrs K. M. KEDDIE.

Cod-fishing.

Salmon-fishing comes to an end about the 20th of July, and in the first days of August the families move out to the fishing places near the sea, mostly to Paks Harbour, there to collect with trawl and jiggar the cod needed for the winter. They also sometimes catch herring in September and October. Usually, however, the families move back to Dove Brook in the middle of September.

Home duties and home life.

At the beginning of the autumn they are in the village looking after their homes and getting their tools and tackle in order before the trapping again calls the men to the woods at the beginning of October.

In between these periods the trappers do much work about their homes; they look after their potato plots; other vegetables are not cultivated in Dove Brook because of the absence of the people from their chief place in summer.

At the beginning of June the snow has melted even in the woods, but the earth is still hard and night frosts are common, the drift-ice still lies out at sea. For this reason potatoes are only planted late in June and taken up in October; in 1937 no potato-tops were showing on the 28th of June. In Sandwich Bay again there are no cows; the only domestic animal is the half-wild draught dog. The people said they do not yet keep cows or goats because they fear that the dogs, if they broke loose, would at once put an end to them: 'It has always happened like that before when people here tried to take up cattle-breeding.' Now the children must be satisfied with vitamin-free condensed milk. Salmon, bacon, salt beef and tinned food with Nestle's condensed milk (the original from Vevey) are prominent in the home food. Factory products are more and more replacing local, home-made products. The acceptance of the urban pattern is evidently due to their usefulness for self-maintenance.



Fig. 299. Harnessed dog sledge. Photo Mrs K. M. Keddie.

Thus the life of the Dove Brook people is still conditioned by the country's own resources and the yearly rhythm of nature, an unchanged, hunting and fishing half-nomadism. It is thus in its essence the same kind of life as we know among the Skolts of northernmost Finland a century ago (Fennia 49, No. 4) who lived in nearly the same natural conditions. In this way one understands that in Labrador, too, the livelihood of the people of Dove Brook is quite secure, because the risks of bad years can be distributed over different occupations. The present high standard of living seems thus to be secured for the future so long as these nomad-hunters follow this persistent, self-sufficient complex of livelihood and the trapping-grounds are big enough for all.

Dove Brook with its white, green-edged houses with black roofs looks charmingly cultured against the background of the dark, unfriendly spruce forests to the north; cf. Fig. 300. This village has a saw-mill of its own (to the extreme left of the picture) and a church-schoolhouse round which the family houses have grouped themselves. Each family has its own house with storehouses and sheds; to the left of the picture George Bird's two-storeyed house can be seen, also Tom Bird's house, the church and Robbot Bird's house. In the middle of the village there is a curious building, a wooden erection with a platform on which the dogs' food — chiefly seal carcases — is kept, so that the animals shall not be able to get at it if they manage to break out of their stockaded kennels; these lie inside the wood and cannot be seen on the picture. The houses are very roomy for the children are numerous; Fig. 301.

When I visited Dove Brook it was empty of people as they had moved out to the salmon-fishing places. But one had only to enter; no house there is ever locked when the owner goes away. Robbery is unknown; a trapper never touches anyone else's things and he seems to have a very high conception of the obligations of a visitor and of the demands of cleanliness. The houses were models of order and spotlessness. — In all the many thousand kilometres that I travelled in Labrador I never saw vermin; cleanliness of home and person were generally exemplary measured by the standard of the Old World. — The living-rooms were comfortable; beds and chairs had down cushions, the tables were large. Every house had a radio, which gives them the news from England and America. No newspapers reach the coast; the people neither subscribe to nor read newspapers, for in Labrador no sensible person thinks of wasting time in this way. Though they like books and magazines very much, most of the books seen were of a religious nature, prayer books, etc.

A stranger wonders how a church was built for so small a community as Dove Brook. In reply to my enquiry the clergyman of Sandwich Bay, the Rev. Spershoot, told me that the church building serves both the spiritual and the social well-being of the people. The village folk helped in its erection and its maintenance lies directly in their hands. The white population all over Labrador is predominantly very religious; when beginning a meal the head of the house never omits to ask a blessing aloud. Twice during the winter they are visited by a priest, in the summer they travel to the main church in Cartwright. Here the spirit of social and individual ownership also comes into play as vitally as the religious feeling (cf. 510). Like people of the wilds in general they are inspired by a strong feeling of common sense and solidarity; voluntary, generous collections for different purposes are quite sponta-

neous among them, and co-operation is usual. Also in Mulligan a school-chapel was built in 1938 by free labour, the men of the place sharing the task. The small communities in the North West River district have had community radios for several years.

The church in Dove Brook also serves as a lecture hall; — the people love lectures, and visiting strangers are at once invited to speak on different subjects. It is no dull half-civilisation which meets us here. School education has had fine results, as one could notice after quite short conversations with the young people.

On the whole the inhabitants of Dove Brook are a healthy, happy and good-looking folk; cf. Fig. 301. Intimacy and loyalty of the most agreeable kind stamp the daily social intercourse. The people seem to have no idea of nationalistic politics. Nothing is known of universal suffrage. I met no one on Labrador who had any idea of what is meant in Europe by nazism, communism and other such -isms. All religious forms and inherited customs are strictly observed. This is precisely what JUNEK found among the people of Blanc Sablon.



Fig. 300. The winter dwellings of the Dove Brook people in Sandwich Bay. On both sides of the church-school are the families' homes ranged along the brook whereas the warehouses, dogs' kennels etc. are placed at the edge of the wood behind the houses; near the houses small potato plots. At the left margin is seen part of the people's sawmill for household use. The scaffold in the foreground is the cache for the dogs' food. In the foreground masses of trees which the freshet brings every spring. Photo the author, June 27th 1937.

CONCLUSIONS.

An interesting conclusion may be drawn from a study of these two trapper communities. If we compare the favourable economic conditions of those who live on Lake Melville and Sand-

wich Bay with those of their neighbours the Indians we get an indication of an interesting psychological circumstance: the Indians live for the day only and rather despise the trouble that the whites take for the future, while the whites arrange their life with foresight and prudence. In Labrador the root of civilisation lies in thought for the future. The Indian has remained at the fluctuating stage of childhood, he exists on the remnants of the higher cultural conditions in which his forefathers lived farther south. But he is so undeveloped that his brain cannot conceive the usefulness of uniting the



Fig. 301. Members of two families Bird from Dove Brook at their salmon-fishing place in Sandwich Bay. In the background are seen the southern spurs of the Mealy Mountains. Photo the author, June 26th 1937.

coastal culture of the Eskimo with his own inland culture. The trappers have made this amalgamation and in this way the white immigrants have raised themselves to be the undisputed rulers of the country. Their descendants may unconditionally and permanently conquer the land by means of economic peaceful penetration.

But the question must be asked: Will this condition of affairs continue even after industrialisation has forced its way hither? In North West River it can already be noticed that the desire for ready money has caused the trappers to work for wages and neglect sea-fishing completely; so much time is lost on the long journeys the latter demands that they find it more advantageous to

buy their supplies of winter fish than to catch them themselves. The few (five or six) families who of late years have still travelled out to Indian Harbour with their fast motor boats to fish cod seem to do so more as sport than to fill a need. In 1937 it was said that only six trapper families still fished for salmon in Lake Melville. On the other hand nearly every family catches seal for domestic use (boots, dogs' food) on Green Island. Here we meet an indication of an evolution towards a more specialised economic life and for this development the natural conditions are the best (cf. p. 746 sq.).

Circumstances are the same as in Dove Brook in the main for the white population north from Lake Melville, as well as the half-breeds in the country round Makkovik, Hopedale, Davis Inlet, Voicey's Bay, Nain, Nutak, and Hebron. The farther north one goes along the coast the shorter are the watercourses falling into the Atlantic and the shorter therefore are the stretches of trapping-ground into the interior. I have never heard that the whites there lay their trap-lines very far inland. Out from the first four districts on the other hand the islands are usually the haunts of many foxes, and there they place the traps. In the northern districts the smaller income from furs is compensated from other sources.

Here we come to another type of population, the so-called

Liveyeres.

Terminology and origin.

The resident white fishermen of the outer coast are mostly known under the title of l i v e y e r e s, a West of England word supposed to be a corruption of 'live here' (325). On the southern coast a distinction is also made between *liveyeres*, English-speaking, semi-settled fishermen and *habitants*, semi-settled fishermen who speak French. The former are also termed 'p l a n t e r s' or 's e t t l e r s'. The name 'planter' is erroneous; the local inhabitants when talking of planters mean fishermen from Newfoundland, who return to their homes when the season in Labrador is over. Ferland (253) wrote: *planteurs*, je dois employer ce nom de planteur que se donnent les habitants de la côte, quoiqu'il n'y en ait que deux ou trois parmi eux qui plantent des pommes de terre. On the other hand the term 'settler' should be eliminated because it may give rise to confusion; in the coastal district north of Makkovik this is the term given to some semi-settled half-breeds of white and Eskimo; it is better therefore to avoid the word, or to use the term 'white settler' to

avoid misunderstanding. North of Hopedale there are said to be practically no pure white residents except the personnel of the Moravian Mission and the Hudson's Bay Company. North of the Kiglapait Mountains there are no hamlets but only some houses on the lonely posts of Nutak, Hebron, and Port Burwell (275). Thus the resident population becomes fewer and fewer as the northern limit is approached and the harshness of the climate and the lack of food increase; cf. Fig. 210.

The liveyeres all dwell beside salt water in summer. Meanwhile there are few signs of man's presence on the shore, only some few small clusters of fishermen's dwellings fringe the coast. Some lie in rocky convolutions on the open shore at the extreme edge of the mainland, other, in some few cases, on islands or inlets or bays or river estuaries presenting an aspect forbidding in the extreme. Geographical factors have naturally largely determined the distribution of the summer settlements, but they have also restricted their contact with the outside world. If it is only possible the people settle near some lines of communication; in this respect Gready is typical of southern Labrador, having grown up at a narrow tickle separating two islands, along the shores of which small houses are scattered (275). At the northern part of the coast in the long bays some lonely families may be found here and there. At the head of such a bay will be the house of an elderly settler, whereas his sons and daughters, having married, have built dwellings of their own on either side of the bay right down to the sea (761). Most of the bays, however, are still untenanted. The map, Fig. 210, shows approximately the distribution of this coastal population. There is a visible relation between the size of the fishing village on the one hand and the calmness and strategic position of its harbour on the other.

The importance of these fishing villages must therefore not be over-estimated; one can speak of only one town on the whole Newfoundland-Labrador coast, namely Battle Harbour; Fig. 340.

The clusters of liveyeres' dwellings present a picture which differs much from those of the trappers.

Duncan (233) wrote: As a permanent abode of civilized man Labrador is, on the whole, one of the most uninviting spots on the face of the earth. This impression of the liveyeres' home country we find repeated in the literature. Tucker (961) in 1839 stated regarding the liveyeres: I am not placing them very high in the scale of civilization. There are none among them who can read or write, save the few traders... utterly ignorant... no very high value is placed upon the virtues of chastity and morality... the vice

of intemperance prevails. The small fishing villages which dot the shore fringe between the misty ocean and the forest wilderness in the rear are still (1940) at the folk level.

They have arisen in different ways.

McLean (610) a century ago described the [planters] liveyeres on the Atlantic coast as consisting for the most part of British sailors who preferred the freedom of a semi-barbarous life to the restraints of civilisation. They passed the beginning of the summer catching salmon, which they bartered on the spot with the traders for such commodities as they required. After that they proceeded to the coast for the purpose of fishing for cod for their own consumption. Late in autumn they went to the interior where they passed the winter in trapping fur-bearing animals.

The liveyeres of to day are evidently to some extent descendants of those pioneer fur-animal hunters and seal catchers who married Eskimo or Indian women. The features and the brown skin, e.g. in Batteau and Battle Harbour, indicate in many cases that either Indian or Eskimo admixture on the mother's side must be present. In the primitive conditions of these wilds natural selection was a hard and merciless reality. Certainly many of mixed blood perished or have been assimilated with the natives. Only those more favoured by nature have issued victorious from the struggle.

But especially south from Sandwich Bay a good proportion of the liveyeres are descendants of Newfoundlanders. These stayed on the coast to take care of the fishing-rooms and property left there over the winter by the people on the schooners (p. 748) and remained from lack of initiative or ability to get away (325). Other people finding living too expensive elsewhere and dissatisfied with their settlements in Newfoundland and hearing of the plentiful fishing and sealing in Labrador came in parties from the eastern coast of Newfoundland to establish themselves here and try their luck as fishermen-trappers; in this way the south shore seems to have been settled (435). Many too began to know Labrador from passing schooners and finally settled here because of the fishing. Occasionally women came from Newfoundland and were incorporated in the society through marriage. Many of the white settlers from Newfoundland claim an ancestry originating in Devonshire, Cornwall and the Channel Islands (510). Many of the liveyeres are still Newfoundlanders by birth but Labradoreans by adoption (7).

Some of the liveyeres are however the descendants of people who immigrated direct from Scotland and England. Unfortunately there is no register which makes it possible to reconstruct the genealogical tree of the liveyeres.

The English tongue is universal amongst the eastern Labradorean liveyeres but many of those living on the Straits of Belle Isle also speak French, the language common along the Gulf Coast, especially westward from St. Augustine. There are many English dialects among the liveyeres which are very difficult for a foreigner to understand and may give some indication of the original race from which their ancestors sprang (127). A particularity of some of the Labradorean liveyeres is to give sex to all the ordinary objects of daily life; I left he [the rifle]; put he [the kettle] on; he's [the wind] come right across (761). On the other hand the local people have some difficulty in guessing the home country of an English-speaking foreigner; a lady who had wondered very much from where the writer came finally exclaimed: »You are a Scotsman.» The French spoken in Labrador has many picturesque archaisms but was not at all difficult for me to understand.

The semi-nomadic life and the two dwellings.

The aspect of the dwelling-houses of the liveyeres vary from place to place. At the Straits the wooden houses are neat and roomy, ordinarily built in two floors: on the ground-floor is the kitchen, a sitting-room and the sleeping apartment of the parents, whilst the dormitories tenanted by the youngsters are upstairs. Cleanliness and comfort are common. In olden times the houses were brought ready made from elsewhere. Now to-day, since saw-mills have been built, they are constructed in Labrador itself.

But when one comes to the Atlantic coast the habitations are mostly very humble, and at lonely places the famous 'tilts' which Hind reported are said to exist still. They were generally formed of stakes driven into the ground and covered with moss and bark.

Semi-nomadic life and two dwellings west of Red Bay.

Most of the liveyeres still possess two homes as in bygone days (961, 235). The one for s u m m e r r e s i d e n c e — *la maison de large* (253) — is close to the sea at the fishing-station; cf. Figs 302 and 303. Wilder homes can scarcely be imagined than, for instance, the summer dwellings on Ragged Island, where the people can walk literally only some meters on land, all movement being on the sea; cf. Fig. 303. The w i n t e r d w e l l i n g — *la maison de terre* — occupies a most sheltered position, and is situated some distance up a wooded valley. The people from Chateau Bay, for instance, spend the winter some five miles up the valley, and the Ragged Island liveyeres move up into the

Stag Bay Brook's forests. Some of the northern liveyeres prefer to pass the winter in the Mission settlements where they have educational advantages for their children.

Similar conditions seem to have prevailed in the 1860's; PACKARD says that at the Straits several settlers had different dwellings for summer and winter, often at a distance of two to three miles from each other. About the 20th of October they would leave their summer homes and travel up to seventy miles,



Fig. 302. A liveyere's summer residence at Battle Harbour. Photo the author, Aug. 1937.

for example, along the Eskimo River for trapping and hunting caribou, fox and grouse. Early in the spring they would move down to their summer homes — 'tilts' — at the coast, for from the 25th of March to the 4th of June they devoted themselves to seal-hunting. During the fishing season — June till October — they lived in their rude summer houses.

HIND and many other travellers found it difficult to understand how white people from the downs and coombs in England can live happily with their families in these wild, barren and desolate bays, in a country of privation and hard labour. However, in spite of its hardships and precariousness the life seems to have attractions, and many instances are given of families coming to Newfoundland and then emigrating to the States or Canada with a view to

bettering themselves, but returning again after a few years' trial to their old homes on bleak and barren Labrador, to poverty and starvation. On one side they have here the cold, foam-flecked swell of the sea, on the other naked rocks, swamps and bogs, terminating at the foot of hills or ridges which rise many hundred feet. The natural factors have combined to make the dwelling-places comparatively inaccessible, to isolate the inhabitants from the rest of

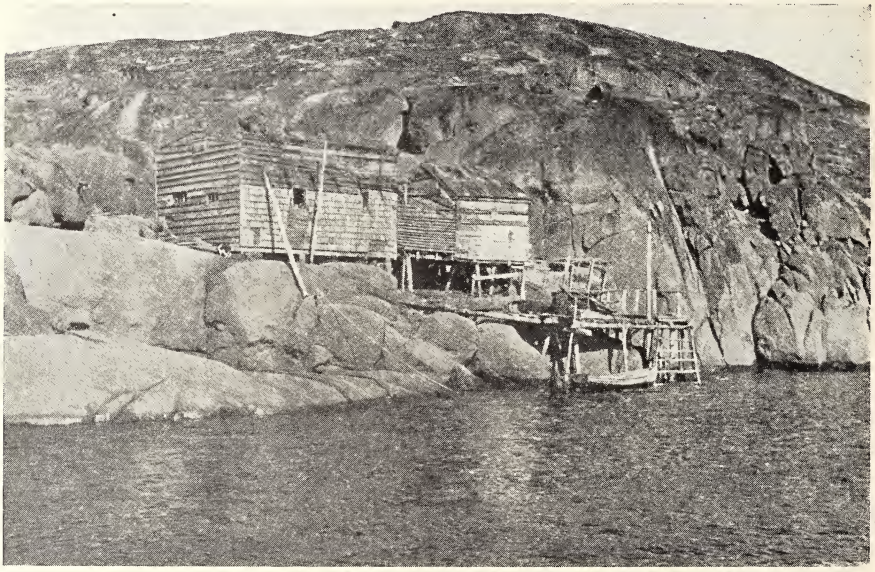


Fig. 303. Summer residence at Ragged Island near Makkovik, used by a liveyere when cod-fishing. Photo the author, July 1937.

the world and even to a surprising degree from one another. They live in what may be called a back-yard (510, 743).

In this elongated culture area the small communities, highly self-contained, are very alike in many of their ways (510). It is no wonder that many observers have found that the lack of progressiveness is the most conspicuous trait of these liveyeres; they are proud of their adherence to the ancient customs of ancestral founders. The imitation from generation to generation imposes a marginality upon them, JUNEK says. And yet they are ingenious and honest, hard-working people, Fig. 304. It is worth while to read the life history of the two Labrador coast dwellers, written around their assumed names, Bill Bayman and Henry Salt (761, p. 184). Here one finds a perfect instance of the restricting influence of natural conditions upon cultural development (522, 891, 1049); GRENFELL gives masses of illuminating examples (see bibliography).

Development into one fixed dwelling west of Red Bay.

The first attempts to settle on the coast of Newfoundland-Labrador goes back to the eighteenth century (cf. p. 480 sq.). In 1763 there were thirteen 'settlers' on the Labrador coast (325). Letters in the Moravian archives state in 1797 that two Englishmen had come to settle near Hopedale. Seven other Europeans were reported in the neighbourhood, two of them having married Eskimo women. In the beginning of the nineteenth century the whites began to advance upon the Moravian Mission's districts. The resident population from Blanc Sablon to Sandwich Bay in 1856 was computed at 1553 persons. In 1868—69 the liveyeres numbered 2479 between Blanc Sablon and Cape Harrison, including about three hundred Eskimoes and Montagnais Indians (325).

From all descriptions one must conclude that this isolated population was much neglected and undeveloped. Yet time has not stood still here.



Fig. 304. The liveyere John Blake. He is one of the best representatives of the Labradoreans. He lost his right arm years ago but supports his large family and is free from debt. Photo the author, July 1937.

At the Canadian part of the coast there is a settled population as far eastwards as Natashkwan, and between it and Blanc Sablon the population is predominantly permanent and cattle-keeping. In the 1860:s Hind wrote of the Gulf Coast people: They have some pigs and sheep and are preparing to bring cows into the southern villages. Nowadays there are fixed habitations on Newfoundland-Labrador right up to Red Bay; according to my skipper in 1939 people here have also procured cows and the families no longer move inland in the autumn for trapping.

On the Straits of Belle Isle, east of Red Bay, there are some few liveyeres' dwellings. But the people here live 'like grandfather did'. In the spring they move to the sea to their cosy, pretty summer house which brightens the landscape so well to hunt seal. In the beginning of the summer they fish for cod, in August and September for herring. This is true, for instance, of the liveyeres in Henley's Harbour. To the east and north from Chateau Bay during the summer, Labrador trappers and people from Newfoundland come

and fish for cod. But Chateau Bay is used by these liveyeres-trappers only in summer; during the fishing time they live there in their neat, white-painted houses. In the fall they move to their homes some three miles farther inland to the storm-protected valleys' while the Newfoundlanders sail home. The liveyeres at the coast from Cape Charles to the north move farther inland, e.g. from Battle Harbour — Fig. 302 — the nine miles to Mary's River, while the liveyeres who live in summer on Seal Island, Bolter's Rock, etc., move about twenty miles into Hawke Bay; Indian Tickle people move about thirty miles to Table Bay and Sandy Hill Bay, and so on. Thus the summer places at the coast are quite empty in the winter, for even the traders go away in October to Newfoundland with the mail steamer; Fig. 311. I think this kind of hunting and fishing semi-nomadism will continue amongst these liveyeres, because there is scarcely any pasturage for cattle on the islands and headlands where they live in summer.

In the most southerly part of Newfoundland-Labrador, therefore, an important cultural-geographical boundary runs somewhat east of the political one. With the exception of occasional visits from seal- hunters all the harbours east of Red Bay are empty of people in the winter. From Red Bay along the Straits of Belle Isle and the Gulf of St. Lawrence, on the other hand, a settled population is living in the bays on the northern shore. Half-nomadism has been abandoned. This settled population has thus grown beyond the liveyeres' stage.

Yet this population does not seem to resemble that of Newfoundland-Labrador in their life otherwise, whereas it does resemble the Canadian culture of the Gulf; not only do they keep cows, at Point Amour I found tracks of a motor car. This gives in a way a new characteristic to Newfoundland-Labrador. Junek (509, 510) has given some attractive descriptions of it, so I shall add nothing here.

We continue further north.

Geographical groups.

The geographical distribution of the liveyere stock in Newfoundland-Labrador according to Paddon falls into well-marked sub-communities, chiefly distributed round the larger bays, each of which is almost a little world in itself (cf. 731).

Battle Harbour is the centre of a considerable group living round St. Lewis' Bay; cod and salmon afford their main means of livelihood since the market

for seal products has fallen away so greatly. It is a straggling group for the most part.

Another group reaches from about thirty miles north of Battle Harbour to about thirty miles south of Cartwright, with the Hudson's Bay Company post at Frenchman's Island roughly at its centre. There is little prosperity in this group.

Cartwright is the centre of the most outstanding salmon-fishery along the whole coast. There is fairly good trapping and some successful agriculture too.

The eastern basin of Lake Melville is occupied by liveyeres and is one of the worst areas in the country for living on the dole.

North of Hamilton Inlet a few enterprising and prosperous liveyere families are to be found.

Let us now take a look at the ways of living of the semi-nomadic liveyeres.

Socio-economic cycle.

Among the liveyeres almost all means of earning are bound up with the seasonal variations. Fish is the liveyeres' quarry almost from one year's end to another (761).

The socio-economic cycle can be considered as beginning with the fishing.

Salmon-fishing

goes back to the first time the white man appeared on these coasts; already early in the 1500's there are reports of salmon-fishing.

In the early summer, from about the middle of June to the end of July, when the salmon has returned to Labrador's tickles and bays, it is eagerly caught by the liveyeres. For this purpose they use so-called salmon nets which the Hudson's Bay Company usually lend them. The amount of the salmon catch varies but is in general rather large. I was told that at some of the larger fiords some liveyere families manage the salmon-fishing so successfully that they never need to move to a special trapping-house, but this may be exceptional.

Experience of the salmon-fishing places north of Makkovik is said to indicate that the catch is steadily decreasing; Jim Lane's Bay was famous a few decades ago for its supply of salmon; now nothing worth mentioning is caught either there or further up towards Cape Chidley. When one compares the information given by Cartwright in the 1770's concerning the salmon caught in Labrador and its yield to-day it is evident that the diminution is astounding.

As the importance of salmon-fishing declines northward that of the sea trout in July and August from Hopedale to Hebron increases. The price paid for it is 5 cents per lb. and it is exported salted to England.

Cod-fishing.

Fishing for cod is the outstanding and primary occupation of the liveyeres. The sea is considered common property. However, Newfoundland fishing schooners and other outsiders are not permitted to enter the liveyeres' fishing domain, except when the weather is so rough that the trespassers



Fig. 305. 'Jigging' for codfish (536 a).

cannot stay outside the harbour, but even then the vessels are only allowed to cast anchor. Cod-fishing is carried on independently by each family unit, though the success of a family depends considerably upon the indirect co-operation it receives from other such units.

Some notes left by JUNEK concerning the work are given here.

In the southernmost part of Newfoundland-Labrador the fishing season begins late in June, when the caplin and cod make their appearance in ever-increasing shoals. JUNEK found in Blanc Sablon in 1934 that during the week of June 17—24 the caplin were plentiful and vast shoals of cod had already started to come in. The caplin turn shoreward to 'breach' and become the prey both of the fishermen who use them for food and of the cod. It is perhaps the best bait used, with clams and 'squid', a species of cephalopod.

North of Hamilton Inlet the cod seldom come shoreward before the first week of July, and the farther north the later (cf. table p. 755).

The cod are caught nearer the Gulf-coast in t r a p-n e t s. These are however very expensive and most men are unable to procure them. They therefore, like all the liveyeres of the northern coast, earn their livelihood by j i g g i n g; Fig. 305. A 'j i g g a r' is a leaden, troll-like decoy cut in the form of a caplin, and having two sharp hooks. A line is attached to it. It is thrown overboard and the fish are caught by suddenly jerking the jiggar up and letting it sink down. This is a laborious process, especially when the water is deep and not many fish may be taken in this manner. Probably every one looks forward to the day when he too will be able to afford trap-nets.

In the autumn on the other hand, when the cod goes out again toward the open sea, to deep water, the 'h o o k a n d l i n e' or 't r a w l', also called



Fig. 306. Receiving on the stage the codfish catch from the 'jigging' boat (536 a).

b u l t o w or l o n g l i n e, with over one thousand hooks on it, is used instead of the jiggar.

The fish is brought home, still alive, to the wharf — Fig. 306 — and later conveyed to a box attached to one side of a large table in the shed. The cleaning of the fish begins. The group of fishermen arrange themselves round the table. The 'cut-throat' reaches into the box, grasps a fish by its eyes and makes a lunar incision on its ventral side across the throat from gill to gill. Then he makes a longitudinal incision through the belly of the fish thus allowing the entrails to fall out. In this condition the fish is pushed to the neighbour, the 'header'. He rips out the liver of the cod, dropping it into a special barrel under the table, tears off the head and tosses it, together with the entrails, over the side of the wharf into the shallows below, where the husky dogs are waiting to gorge themselves. He then pushes the headless fish across the table to the 'splitter'. He runs a square knife under the vertebral column of the fish lengthwise, cutting

out the column on a return motion and dropping the now shapeless mass into another barrel filled with sea- water.

The cleaned fish is transported by wheelbarrow to the 'stage', a small shack where the fish are salted and stored, arranged in rows belly-up on the floor, and sprinkled with crude salt; Fig. 307. In this state the fish are left until they are ready to be dried upon the rocks or 'flakes', the last step of the cod-fishing industry; Figs 308 and 309.

This process is repeated over and over until finally the morning's entire catch has been cleaned. Very little motion is wasted in these processes until the handling of from twenty to twenty- five quintals of fish is finished (1 quintal= 112 lbs Avoirdupois; 1 'green' quintal = 224 lbs). — Often quantities of salmon

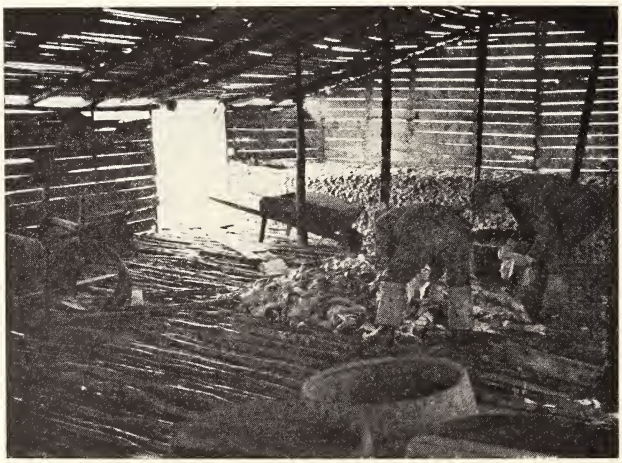


Fig. 307. Piles of cleaned codfish, 'green fish', in the shade (536 a).

get caught in the trap-nets together with the cod; the pink salmon is reserved for human consumption, the white salmon — 'shinks', —- is kept as winter food for the dogs.

During August the fish left in the 'stage' is taken out and the 'making' of fish begins. The washing of the salted cod and its drying on the rocks or 'flakes' take a good long time. The flakes are a framework raised a short distance above the ground and covered with old nets or spruce bark. Lightly-salted cod if not washed and dried is soon invaded by maggots. If August is rainy and foggy and the fish cannot be placed out to dry the catch of the summer can go to waste when drying. One must be perpetually on the alert to spread the fish to be dessicated as soon as the sun begins to shine, to pile them into heaps and cover them with sailcloth or spruce bark, Fig. 309, at the slightest indication of rain or fog. This process goes on for about a week. More fish is taken out of the 'stage', washed and dried until the whole season's catch has been disposed of (510).

An important by-product of the cod catch is cod-liver oil. The liver is ripped out of the cod by the 'header' and dropped into a special barrel. When this is full, its contents are dumped into a larger barrel. Left exposed to the sun and air the liver decomposes and the oil rises to the surface. At the end of the fishing season, about the fifteenth of August, the oil is drawn off, poured into barrels and sold.

Cod-fishing goes steadily on in the northern parts of the coast the whole summer and autumn, in the southernmost parts on the other hand only until the end of July. By then at least two hundred quintals of fish per family must be caught, salted and dried in the southernmost part of our district, or economic disaster follows, according to JUNEK. About this time the dogfish, a variety of shark, comes and not only drives the cod away but also tears the meshes of the cod-traps.



Fig. 308. Codfish spread out on the rocks to dry (stock-fish). Photo the author, Indian Harbour, Aug. 1937.

Some liveyeres are employed directly by the Hudson's Bay Company in cod-fishing in the southern part of the coast. They are furnished with fishing-gear and other utensils, wharf and stage. In return they receive twenty of every hundred quintals of fish they salt and cure. They have to pay the company a rent for the boats used and the current price for gasoline (510).

The herring generally come shoreward at the southern part of the coast late in August and in September and are caught in nets that have meshes one and one quarter inches square. The herring is cleaned, the entrails are removed, and the fish salted down in barrels. But the profit is most meagre, and herring-fishing is looked upon as a minor occupation only. It is considered more advantageous to keep the herring as winter food for the dogs than to dispose of it by trade (510).

The liveyere works exceedingly hard during the fishing season and must be difficult to beat on his own ground. When the weather prevents him from

going to sea nets and lines are repaired, and in this work the women also take part. From about the middle of August the women and children are engaged in berry-picking, especially bake-apples (*Rubus chamaemorus*) and plumboy (*Rubus acaulis*).

In the late autumn wood-gathering is the second of the primary activities. It is gruelling work, from year to year the distance increases to the places where firewood is to be had. Before the snow falls the wood is cut and the resinous roots of stunted conifers dug out and piled in heaps until it can all be transported to the home by dog-sledge. At home the wood is piled in conelike heaps, which give a peculiar aspect to the villages.



Fig. 309. Piles of dried codfish covered with spruce bark ready for export. Photo the author, 1937.

Transference to the winter-dwellings and trapping.

In September or October the fishing has been brought to an end and the family transfers to their winter-dwelling.

When the snow begins to fall hunting and trapping become important activities. In the south the hunters now go many miles inland. But in the north, PRICHARD wrote, the liveyeres are said to be unwilling to penetrate into the interior: They seldom or never go over the threshold of the unknown, 'it is a place where men starve', they say. In fact, few things have struck me more, PRICHARD continues, than the almost universal fear which lay upon the fisher population of this barren coast with regard to the rear hinterland upon whose eastern lip they live. The reputation of many difficulties for travelling has attached itself to the country: 'he was compelled by the want of provisions to relinquish his project and return home', we hear again and again; they fear the sterility of the inland, difficult navigating of rivers, scarcity of food, not a track or the glimpse of an animal, and the severity of the eternal loneliness of the forests. Their belief has naturally been strengthened by the calamitous results of different expeditions, for instance LEONIDAS HUBBARD in 1903, KOHLER, CONNEL and MARTIN in 1931, two American engineers in 1930 (?) etc.

For many liveyeres there are therefore only the fox and the weasel to trap through the winter. The musk-rat and others are not encountered by them between November and May; they live around freshwater accumulations which freeze over, forcing them to hibernate. Marten, mink and lynx are very rare in the forests near the outer coast (510). The trapping and hunting goes on until the end of March or beginning of April (cf. p. 716).

Return to the summer-dwellings. Sealing.

The seal-fishery was one of the principal inducements to the first settlers on the coast, but it has since the beginning of our century ceased to be commercially pursued by the liveyeres. However, the liveyeres still take up sealing on a smaller scale, JUNEK reports. The enormous masses of ice which the Labrador Current brings from the north during March bring also thousands and thousands of seal which have sought refuge on the ice floes for the purpose of rearing their young; these are the so-called 'seal meadows'. Now thousands of men from Newfoundland are engaged in sealing. Fantastic are the catches reported by HIND; in 1827 in one single week forty-one vessels laden with 69,814 seals arrived at St. John's; one vessel took upwards of about 3,500 seals in six days (45 a, 1085).

During and after the second half of March seal are hunted openly on ice floes also by the liveyeres; they shoot them when they are sleeping on the ice floes, because the flesh of the young seal is always welcomed. This is difficult hunting for people who do not know the easily manoeuvred Eskimo kajak. Throughout the latter part of April and almost all May, which is the main season, sealing is carried on also by means of trap-nets more than a hundred fathoms long by ten fathoms wide with meshes eight inches square, which are placed under the ice, sometimes several of them together. At the Straits the nets are placed so that the entrance is to the westward because the animals are going northward. The seal fat taken in the spring is softer and more mellow and forms the pale seal oil of commerce.

*

Thus in the organisation of the liveyeres' material culture pattern traits are encountered of Eskimo and Indian ways of living. Only this could permanently guarantee their self-sufficing means of livelihood. Traits of modern Euro-American pattern which are appropriate and expedient are, however, increasingly assimilated and the new mechanical means and methods bring the liveyeres nearer and nearer to the universal culture (510). They thus

represent a rather complex social product. Though there is still an important gap in their culture accretion: cattle-breeding. The natural conditions in many bays seem suitable, and I was not a little astonished the first time a liveyere told me about the impossibility to keep cattle in a village with husky dogs: the dogs will soon kill and finish a cow, he said. Later I heard of many instances confirming this opinion. FERLAND (252) says that up to that time [1858] with two or three exceptions no settler had succeeded in raising any domesticated animal because of the dogs; cats, cows, pigs and sheep have

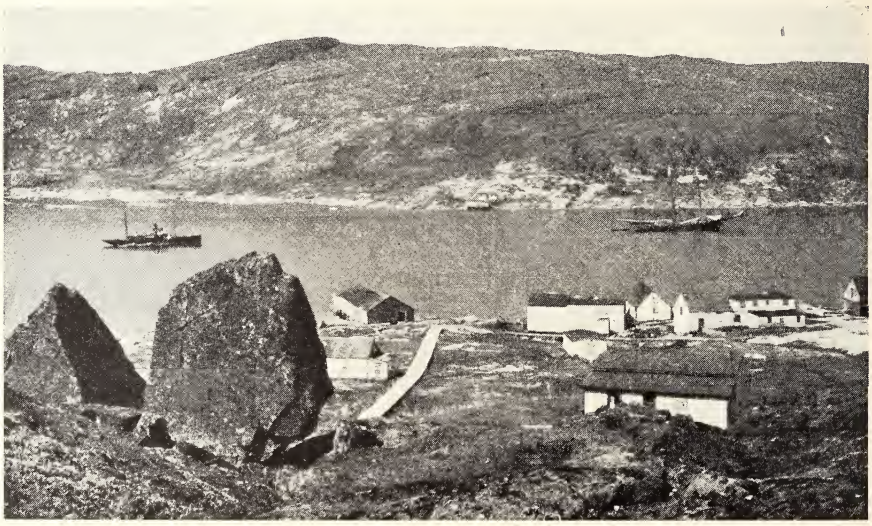


Fig. 310. Indian Harbour, a much frequented fishing harbour with two merchants. To the right Jerrett's trading-post. To the left S/S *'Strathcona'*. Photo the author, July 1939.

all been destroyed by them; only one pig and one goat had escaped the general massacre when FERLAND was on the coast. GRENFELL told of a goat which was landed from the steamer when he came to see a patient. He went with the settler's wife up to the house, but turned before entering to look at the landscape, and what did he see! the goat killed and partly torn to pieces by the dogs.

Yet I cannot believe that this explanation is anything else than an incurable superstition. The development at the Straits of Belle Isle challenges the old opinion, for there both dogs and cattle are to be found and still no such accidents are reported.

In this people, however, whose food is almost exclusively fish, dietary defi-

ciencies often result in avitaminoses of varying nature and severity (510). The flesh of the fur-bearing quadrupeds and seals as well as berries is of a certain value in this respect, but for fighting the consequences of the avitaminoses and fortifying the health conditions of these weak people the most practical means is probably a supply of fresh milk.

A closer scrutiny however reveals that edible plants grow among the hills, most of these are berry species: bake-Apple (*Rubus chamaemorus*) plumboy (*R. acaulis*), crowberry (*Empetrum nigrum*), blueberry (*Vaccinium pennsylvanicum*), strawberry (*Fragaria virginiana*) and cranberry (*Vaccinium vitis idaea*) There are three varieties of currants. The raspberry is frequently found in sheltered places in the southernmost part. The gooseberry also grows here. From high bush cranberries (*Viburnum pauciflorum*) a jelly can be made. Edible plants of the green-leaf class are alexander (*Ligusticum Scoticum*), in taste like parsley, and dock (*Rumex occidentalis*) (985, 510).

On the shores of Northern Labrador two common plants grow which could be relied on as a source of certain vitamins and foodstuffs: *Atriplex glabriuscula* Edmonst. and *Elymus arenarius* L. var. *villosus* E. Mey. (275).

Social problem of the liveyeres.

The liveyeres present a very difficult social problem for the government of Newfoundland (392 a, 97). In the 1860's Packard wrote as follows of those south of Sandwich Bay: Dirty, forlorn tilts, smoked and begrimed with dirt, the occupants in some cases thoroughly harmonise with their surroundings. Their features and hands are smoked dark and their rough life is more or less demoralising, but certainly law and order are well maintained on the coast, and no cases of immorality came to our ears. The pictures of these people's lives as found in descriptions by Grenfell and others are terrible. Involuntarily a sentence of Whitbeck and Thomas flashed to my mind: Adjustment to the subarctic regions means not only adjustment to a very cold climate, but it means adjustment to poverty of materials with which to build and work, poverty of vegetation and foods, poverty of opportunity, poverty of association, poverty of mental stimuli, and, normally, an almost complete absence of all that makes for civilization (1023).

On the whole the liveyere stock must be graded as unsuccessful, Dr Paddon writes about those on the Atlantic coast (731). Why?

First, these bay sub-communities have sprung from small groups of settlers aggregated around trading-posts, and it is well known that paucity of blood-stock is prejudicial alike to physical and mental welfare in any community. Moreover the fusion of white with native blood was bound to result in a very difficult problem of adjustment for the half-breed. Perhaps the Indian or

Eskimo instincts predominated whereas the family life and surroundings tended towards the European. Such a man needed understanding, encouragement, stimulation and firmness and too often met with the opposite. To Dr PADDON's personal knowledge, many of those stigmatised as hopeless when left to themselves can be both docile and reasonably industrious men when supervised and handled with common sense.

Secondly, choice of occupation is at a minimum. Trappers, especially, are born rather than made; and many men are fooling with a few traps rather than aiming at self-maintenance. It is to no trader's interest to fit them out for trapping; it is almost certainly a losing game. At the same time they crowd out the trappers who might succeed in some districts at least.

Thirdly, the problem of settlement life versus isolation is one that hampers not a few. Attracted by church and school facilities or the chance of a job there is a tendency to congregate unduly at times. Fuel soon gets cut out for miles round a settlement of any size, there is not enough game and fish to go round, and there is danger of a contaminated water supply. Moreover some really best fitted for settlement life persist in isolation, and drag down their nearer neighbours who are within sight of success if unencumbered, while others who might succeed in a humble way if living and working on their own account fail as members of a group.

Fourthly, there are groups of human limpets clinging to unproductive rocks without hope of any success and with no higher ideal than the dole, while there are rather favourable tracts elsewhere either totally uninhabited or undermanned.

My skipper — WILL SIMMS — who knew very well several of these despised liveyeres south of Hamilton Inlet, gave me a greatly modified picture of their conditions. He said that at the beginning of this century they had in the main worked themselves up into an energetic and relatively wealthy population, who lived in good houses, were well dressed and well fed. The complication which followed in the tracks of the first world war had, however, altered the picture: Poverty seemed to have come to them again. Constant undernourishment is showing its influence on the people's physique, and the standard of living is falling every year. They see that the yield of that exhausting work, fishing, is only losing in value, so it is not surprising that many of them have lost hope of a brighter future, they have resigned themselves to the worst, suffer in silence and lose interest in life generally; they get the dole of six cents per day and with that they can of course keep alive, but the physical condition of the people is slowly deteriorating; the new generation is born

and brought up in extreme poverty and hunger. For purely physical reasons many of them are obliged to give up trapping in the wooded valleys; they lack the strength and the food, and then set their traps in the neighbourhood of their winter homes where the game caught is scanty. The majority earn their livelihood by fishing.

From another quarter I heard an opinion which surprised me at the first moment: that these people's poverty was due to the district being 'over-populated', that is to say in respect of the trapping. The woods in the river valleys in the south-eastern end of the Atlantic coastal strip of Labrador are thin and considered comparatively poor in fur-bearing animals, and in support of this it was said that not even the Indians, who have of course an unusual ability to move all over the land, carry on trapping there. These liveyeres therefore only set traps on a small scale for the foxes around their homes.

This, however, cannot be the reason for their poverty, it was said from other quarters presumably in a position to judge, while referring to the fact that the sea offers an enormous quantity of fish and seal, and if the people were not indolent they would not need to be in want because of nature's forbidding harshness. He considered that a contributory cause of the depressed situation was that the standard of living had been raised far too high during the prosperous period of the world war, after which the decline was catastrophic in its effects.

Of course the author cannot take up any personal standpoint on this question. A specialist among the traders told to me that he reckoned that a little family of these 'longshoremen' south of Cartwright required an annual average income of $ 160. According to the same informer the yearly income of a normal family in the Dove Brook community (p. 721) was about $ 600, whereas the trappers of North West River (p. 719) have a yearly average income of $ 1000. These figures place the economic position of the liveyeres in strong relief. What can be the reason for the striking difference which distinguishes socially and economically the southern liveyeres from, for example, the Dove Brook people, who could strictly speaking also be called liveyeres (p. 747)? In our days when one looks from the south to the north it is obvious that the modern influence in a general way diminishes in this direction. But no interrelation seems to exist with the degree of prosperity and the increase of progress in modern ways; JUNEK also found that the cause is not one of distribution only. There must be others, e.g. racial, or historical causes or both. Observers who have been able to watch their development for years have told me that the different origins of the ancestors of these people are to a great extent responsible. The immigrants from Newfound-

land have seldom been able physically and mentally to measure themselves against the strong and healthy, enterprising immigrants from Scotland and England. Nor have the latter had to drag with them the old sour dough of prejudice and outlived custom like the former. In the struggle for existence under the hard conditions on the coast these basic differences between the two population elements have become more and more distinct and divergent; the former have mostly been unable to preserve the physical vigour and mental buoyancy without which man is subdued, gives up hope and finally sinks into the hard, subarctic milieu, while most of the latter have worked themselves up to a condition of being well off and retaining their mental elasticity and good traditions. It must, however, also be mentioned that even among them certain symptoms of degeneration can be observed, e.g. imbecility and diseases traceable to avitaminosis and other scourges of the wilderness.

It is to be deplored if I am making a mistake. But I have been unable to discover any one who has a thorough, objective interest for the temporal welfare of these people since Sir Wilfred Grenfell's death put an end to his unselfish activity for them. And it seems that nobody has yet been appointed to look after their temporal interests.

Supplementary information regarding the liveyeres is to be found in Grenfell's work and the fairly numerous articles written by more or less occasional travellers to the Labrador coasts, and the reader is referred to them (6, 7, 13, 14, 15, 88, 97, 233, 248, 268, 321, 337, 343, 364, 380, 384, 392 a, 485, 509, 510, 522, 709, 718, 820, 833, 920 c, 961, 1095, 1123).

A retrospect. Differentiation of the white population with permanent abodes in Labrador.

The white people of Labrador are of very motley origin. While the new comers were adapting themselves to the harsh natural conditions they became welded, *in statu nascendi* so-to-say, into a new people at first quite homogeneous. At the time this began to happen contacts with the outer world were only occasional, and in order to procure the necessaries of life they were obliged to manage in some way with what the land and the sea could supply. To do this they adopted a half-nomadic way of living which combined the hunting and fishing of the Eskimoes at the coast with that of the Indians in the interior (cf. 522, 743, 891, 1049).

The variations from tract to tract of the nature of the country slowly brought about an internal differentiation of the people. In those parts where the

hinterland is rather narrow, the valleys are occupied by comparatively thin woods where there are few fur-bearing animals; in such cases the white inhabitants' means of livelihood became centred near the coast like that of the liveyeres. If on the other hand the hinterland was of considerable depth and the distance great from the bay heads to the sea their means of livelihood became like that of the trappers centred on the fur-bearing animals and the forests that were rich in game.

As the coast became gradually included in the network of Canadian means of communication, the cultural environment also became changed, chiefly by the application of numerous loans. The liveyeres slowly gave up their semi-nomadism and adapted themselves to the new conditions where cattle-rearing was possible, and fixed dwellings grew up as in Red Bay and districts west of it. In other parts, this half-nomadism with seal-hunting and fishing as its integral part still survives, but is accompanied with a languishing existence, with decreasing income, increasing hardships, degeneration of the people, and increasing, secondary primitiveness.

The trapper communities have arisen by the same amalgamation process as the liveyeres', but the trappers' ancestors seem to have been of other stuff than the latter's. The strong, energetic and enterprising trappers made their way hundreds of miles into the dense woods of the interior where the precious fur-bearing animals live, and they developed such skill in the capturing of these and other game that even the Indians could not compete with them. Their income from the furs increased every year and was infinitely greater than that of the liveyeres and the Indians. They could therefore omit from their annual cycle the troublesome stage of being at the coast, the semi-nomadism was given up and the trappers became settled. Prosperity will increase still further when cattle-rearing becomes included in their economy. An invaluable advantage of settled dwellings was the possibility of having schools for the children and of linking up the adults with Euro-American civilization.

*

Let us now consider the second division of Labrador fishers, comprising the men of the fishing-fleets, who are only summer visitors, coming down through the ice from Newfoundland in the early days of June and July and leaving in October.

The floating population.

Already in the first years of modern times that part of Labrador bordering the Straits of Belle Isle was visited every summer by fishing vessels from Europe. Since DAVIS in 1586 discovered the fishing banks off the Atlantic coast of Labrador it seems probable that more and more such vessels have also paid longer visits to the coast every year. At the present time Newfoundlanders are persistent, annual visitors. They come in boats of all sizes, fish



Fig. 311. The Labrador mail-steamer '*Kyle*' (536 a).

here during the summer and return to Newfoundland with their catch at the end of the season.

To get an insight into the nature and working of the fishery in Labrador it is appropriate to make acquaintance with the terminology used there for the different kinds of fishermen. A distinction is made between three types:

Resident.	Transient.	
Liveyeres or *Long-shore men* (white, or Eskimo half-breeds)	*Planters* or *Stationers* (white shore fishers mostly from Newfoundland)	*Floaters Labradormen. Bankers* (white schooner fishers mostly from Newfoundland)

'Shore-men' are thus either resident or transient. The floaters and planters never penetrate the interior or even pass out of sight of sea-water as do the liveyeres.

The cod-fishery must be studied in connection with the fishery of Newfoundland. It falls into three divisions: the first in point of time is the deep sea 'b a n k f i s h e r y' (996), which begins in the early spring on the banks off Newfoundland. The second, and by far the most important, is the 's h o r e f i s h e r y', which begins in June and may last till October. The third division is the 'L a b r a d o r f i s h e r y' beginning in July and lasting also till October (6, 13, 14, 15, 102, 234, 332, 364, 341, 342, 343, 329 a, 644, 883, 1028, 1083 b). It is the last division which we shall study here.



Fig. 312. Fishing schooners, 'floaters', 'going down to the Labrador'. Labrador schooners are splendid vessels, they are called the world's best sailers, they can do their 11—12 knots in a strong wind. Unfortunately their skippers are not always correspondingly skilled in navigation and wrecks are not unusual. (536 a.)

Planters or 'stationers',

also called 'l a n d s m e n' (1051), are as already pointed out seasonal visitors to Labrador.

The planters are mostly recruited from eastern Newfoundland, e.g. from Conception Bay, Bay of Islands, Bonne Bay, Trinity Bay and Bonavista Bay.

A r r i v i n g a t t h e c o a s t f r o m t h e i r h o m e s t e a d s.

At least five hundred planters travel as passengers on the earliest schooners or mail steamers going to Labrador; Fig. 312. One must come early: 'First come, first served', is the rule here. Many times it has happened that the

stationary crew on their arrival at their customary posts have found the best trap berths in the vicinity, which they have been in the habit of using, taken possession of by a 'floater'.

In the 1860's PACKARD wrote a vivid description of this floating company of people: The decks of the schooners were crowded with men, women and



Fig. 313. View of a fishing harbour in south-eastern Labrador. Probably Black Tickle (52° 27.5′ N. lat., 55° 45′ W. long.) just off Square Harbour. Aerophoto the FORBES-GRENFELL EXPEDITION, 1931.

children, with all their belongings, a number of small fishing boats and dogs on the deck, as well as huts for pigs, goats and hens; the people had, like the old Norsemen, brought their families and stock with them for the summer's stay on the coast; 70 or 80 persons are said to have been crowded into a little schooner without any convenience of any kind (325). Half a hundred years ago there may have been a total employed of about one thousand men and girls with servants, besides the squatters, who fished on the land in stages (862).

On the eighteenth of June, 1937, I had on *'The Kyle'* — Fig. 311 — a company of about four hundred planters with their stocks of food, their tackle and even some boats. They spread themselves over the extreme edge of the coastal strip from Cape Charles to Holton Harbour and Fanny's Harbour near Cape Harrison and even as far as Ironbound Island in Makkovik's Archipelago. They were successively dropped at the outposts, Figs 313 and 310, in the neighbourhood of which they had small cabins of planks, so-called f i s h i n g- r o o m s, Fig. 314, at some places forming small hamlets; Fig. 17. The summer-houses, also called 'tilts', look quite nice, usually painted white, red or



Fig. 314. Cape St. Michael (upper picture). 'Stationers' houses at Francis Harbour (lower picture). Photo the author Aug. 1937.

yellow; the landing-jetty, called 's t a g e' Fig. 306, gives a special character to the whole. It is connected with the 'f i s h-h o u s e'; Fig. 307. The fish-houses are rude structures like low sheds, roofed with turf and built on piles because of the tide, reminding one of the prehistoric pile-dwellings. In some places the beach is lined with stores and 'flakes' (p. 738) on which cod-fish is set to be dried.

F i s h i n g f o r c o d.

Here the planters remain all the summer months to fish cod. This shore fishery is conducted in small boats by parties of two or three men — Figs 124 b and 305 — who used to rely for propulsion on sail and oar, but nowadays they mostly have motor boats. The fishing is done either by hand-lines or by

hook-and-line, baited from the small boats. Some southern planters are said to have fish traps also. The introduction of the gasoline motor, if it has added somewhat to the gross cost of production, has greatly extended the mobility of the planter-fishermen.

The fishing stations present a busy and animated scene in the season. The fish is brought to the stage — Fig. 306 — for curing. Before salting it is split and washed in tubs filled with salt water until it is clean, then put in the waterhorse, packed up with a light sprinkling of salt. It is then brought out on the rocks or on the bawn and spread 'heads and tails'; Fig. 308. After the first day's sun it is made up in small faggots, not more than a half-quintal in each. On the second day it is spread out again all the one way and made up in the evening in larger faggots of two quintals or more; Fig. 309. The next time it is spread out it is made up in piles of twenty quintals and well covered with rinds and tarpaulins round the heaps to keep them thoroughly dry. It remains there for a few days to press and work in the pile (cf. 862). The opportunity to dry and cure fish on shore is thus of the greatest importance, for in this way it is much easier to increase the catch. The curing was said to be rather careless and primitive on the Labrador coast.

It is surprising that the majority of these planters stop fishing as early as August, when the cod fish begins to become most valuable (p. 762). Meanwhile, after this, usually at the end of August, the planters generally return to their homes with their catch. The boats are left permanently on the coast, for the fishermen find their way from and to Newfoundland on the coastal steamers or schooners. Cod-fishing is moreover not a regular pursuit of the shore-men; there is the chance that a lucky day's fishing will give a return out of all proportion to the average (585).

Their fish, 'shore-cured Labrador' (325), constitutes one of the largest items in the cod-fishing industry of the New World.

This traffic continues year after year, and is of ancient origin. An old report was given in 1801 by ANSPACH (15); he says that this so-called northern fishery was carried on by planters from Conception Bay and Trinity Bay. In 1826 before the Supreme Court at St. John's a description was given of the method pursued in shipping crews and fishermen to the Labrador (325). It does not differ essentially from the present custom.

Yet this method of fishing must be rather expensive and seems quite incompatible with good management. To the time lost on the journeys, the arrangement of their baggage etc. is added the great risk factor due to the

unreliability of the presence of the fish, for the planters' radius of action is rather small and his income is dependent on whether the fish comes to the land or not. Morever, in the few summer months they must make provision for their homes' subsistence throughout the whole year as they have no other means of livelihood, it is said. It therefore is most surprising that the schoonermen and planters go to Labrador at all when there is cod-fish near their homes, where for instance the bank-fishery is probably the richest in the world. The reason given by some planters themselves was the lack of profit from their labour in their home districts. I think that for generations this cod-fishing has been a custom, and the power of custom perhaps yearly drives the schooner people up to the bare, barren Labrador coast at the usual time, even when there are enormous quantities of cod near their own homes.

There thus appears to be an enormous difference between the ways of living of the liveyere and the planter. The former can supplement his income in winter by trapping, and perhaps also by some lumbering.

Transitional types.

Many planters have for this reason chosen to set up homes in Labrador between the Canadian border and Batteau and thus gone over into the liveyere group, combining early summer salmon-fishing with late summer and autumn cod-fishing and winter trapping. I have also been unable to discover any essential difference between such longshore men and the liveyeres called settlers, to the south from Fanny's Harbour (Cape Harrison) towards Gready.

There are however some planters who come to the coast on their own schooners as we shall soon see.

Floaters.

The schooner fishers are termed floaters, meaning that they are not generally attached to fishing establishments on the Labrador, but catch their fish wherever they can get it, and take it direct to Newfoundland ports, where it is cured.

The floaters differentiate between the so-called Labradormen, who fish exclusively on the coast of Labrador, and Bankers, who fish chiefly on the great fishing banks outside Newfoundland, and in the autumn make a trip to Labrador to increase their catch.

Among the floaters the

Labradormen

are the most numerous. They work on fore-and-aft rigged schooners of 30—70 tons in teams of 8—10 men. The total number of fishing schooners visiting the Newfoundland-Labrador coast amounts to 2,000 or 2,500 per summer. In the schooners' cod-fishing, as in the seal-fishery, about 90 per cent of the fishing crews are hired for the season on the share system by the captains of the vessels or the fishing stations. Each individual on board, from master to boy, draws, instead of pay, a certain defined share in the profits of the venture. Usually the schooners belong to business men from Newfoundland, and the owner, like the skipper and the crew, gets his share of the catch at the end of the season. Half the catch usually goes to the skipper for finding and feeding the crew. When the fish fails it means that months of labour and hardship give no return, and the personnel of some unlucky vessels must depend for their winter's provision on an advance from one of the merchants, who looks to recoup himself from the result of the next or a future successful season. For this reason the Labradormen are very anxious to begin fishing early in the summer.

The yearly income of these fishermen is, as pointed out above, wholly dependent on the yield of fish in Labrador, and if they get to their places early they may even catch two boatloads of cod during the summer. It may be said that generally the Labradormen find their way to the fishing-ground as soon as the pack-ice belt begins to disappear, generally about 15th June, but some try to force the ice earlier.

Cod-fishing and its organization.

In the end of May or beginning of June or as soon as the ice is gone in the south the Labradormen begin their fishery in the Straits of Belle Isle. They wait here some time desiring to continue their way to their Labrador fishing-grounds as soon as the ice breaks up on the Atlantic coast. As first come is ever first served along the Labrador coast, he chooses the best berths for his trap; Fig. 312.

The following extracts from shipper Nicholas Smith's fishing reports may give some idea regarding the departure for Labrador:

Extracts from skipper NICHOLAS SMITH's (862) fishing reports from Hamilton Inlet (Bluff Head, Smokey, Holton):

Arrival at the fishing station	Cod appeared at the coast	Cod traps set out	Departure for Newfoundland
1874 June 15	—	—	October 11
1875 » 17[1]	July 7	July 12	—
1876 » c. 20	June 25	» —	» 10
1877 » 30	July 12	» 30	» 15
1888 July 12	» 15	» —	» 10
1890 June 27	» 7	» —	—
1896 » 22	» 4	» —	—
1897 » —	» 3	» —	—
1900 » 18[1]	» 7	» —	September 25
1901 » 17[1]	» 7	» —	» 28
1902 » 23[2]	» 7	» —	» —
1903 » 20[3]	» 15 [6]	» —	October 7
1905 » 20	» 9	» —	» —
1906 » 16[4]	June 20[6]	» —	» —
1907 » 19	» —	» —	» —
1908 » 19	July 11	August 20	» —
1912 » —	» 9	» —	» 25
1914 » 17	» 7	» —	» —
1919 » —[5]	» —[7]	» —	» 16
1922 » 20	» 7[8]	» —	» —
1923 » 17[1]	» 7[9]	» —	» —
1925 » 21	» 9	» —	» —

Some of the floaters live and work all the summer on their schooners and trap-boats.

Others have procured fishing-rooms for themselves, to which belong besides the dwelling a fishing-stage, a small hold for about 300 quintals fish, a bulley or fishing-boat to carry about 16 quintals, and a good bawn for spreading about 300 quintals fish. Bunk-houses are built when the dwelling-house cannot accomodate the whole crew. In the 1870's the dwellings were mostly sodden tilts.

The latter group of fishermen thus forms a transitional type resembling the planters.

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[1]) No ice. [2]) June 17 stop owing to a jam of ice, later no ice. [3]) Much ice. [4]) Ice jam in Hamilton Inlet. [5]) Much ice remained in the bay until 20th of July. [6]) Fish scarce. [7]) Very bad fishing. [8]) Very plentiful. [9]) Not very plentiful.

After the arrival the first job is to build out stage-heads, repair boats, land the supplies and gear and fit up the houses after the winter's ice and snow. Then it is necessary to go up the bay to secure a load of firewood and timber, longers and shores. During this time others of the crew secure trap berths and try by »jigging» to find out if there are any fish. For all this work part



Fig. 315. The trap-boat goes out (536 a).

of the schooner or steamer crew were also used so that one would not be behind time when the fishing had to begin.

With all the ice gone the outlook for fishing becomes favourable. Good and bad fishing season alternate irregularly; when caplin and cod come in together, it is considered by the fishermen as a good sign. The cod was formerly taken as in the Stone Age, by 'jigging' or by hook-and-line or bultows with up to 1400 hooks on them. The men in the fishing- boats caught cod-

fish by 'jigging' as fast as two men could pull up the long lines. The method of taking fish always by hook-and-line — Fig. 124 b — was only amongst the English; the American ships were generally furnished with large seines.

Some seventy years ago cod traps began to be used also among the English fishermen on this coast. It is a huge box of nets the meshes of which are two inches square securely moored in the water and with 'leaders' stretching out in several directions to conduct the shoaling fish into the trap, from which they cannot find their way out. It is about three hundred and twenty-four feet long, fifty feet wide and forty-five feet deep; the edges are kept afloat by cork disks, the bottom edges are weighted down by lumps of lead. A leader-net two hundred and forty feet long finishes with an opening at one end into the trap. The price of a trap is between three and four hundred dollars (510).



Fig. 316. The trap-boat on Queen's Lakes returning overloaded with codfish. Photo the author, July 1937.

The trap nets are set at places where the fish are thought most likely to be running and it is astonishing in what rough and open places the cod-traps are sometimes put in spite of the sea and the fog, as I saw in the berths at Salmon Island. The crew have in that case also to remain with a barometer on the shore to watch. But there they often get the huge fish. When there is no ice to interfere with the cod-trap operations prospects are good.

The trap system may give large catches; it may give none. Large catches are sometimes made in a very short time with the trap; the fishermen only sit upon the rocks and wait for the fish to run into it. But it is a hazardous method, the fish may or may not run in, whereas a catch is generally ensured with the hook-and-line method.

Trawl-fishing (p. 737) on the off-shore grounds is practised in the autumn.

Weather permitting the men go out to the traps at sunrise, usually in motor-driven fishing-smacks — trap-boats; Fig. 315. When a good catch — Fig. 316 — is anticipated a motorless boat is attached by rope to the former. The fish is taken out of the trap by hand and flung into both boats; if good the

morning's catch constitutes from twenty to thirty quintals. The fish caught are gutted, washed, split, — Fig. 317 — heavily salted and stowed in the hold until the catch is complete; Fig. 318. At same stations it is also dried on flakes or the rocks; Fig. 320.

The fishing just described is hard work: dressing down the fish, splitting and salting it goes on all day until dark, and even then often until one or two o'clock in the morning in the faint light of an oil lamp. Sometimes the men have only had two or three hours' sleep when they are called again at daylight to go out with the trap-boat. Many times there are even conflicts about breaking the sabbath. SMITH (862) writes: We wanted to finish then as it was Saturday night, but we were forced to stay in the stage till 2.30 Sunday morning; this was against every man's wish, but it would be a greater sin to let our beautiful fish spoil for want of being salted. So we took our chance, and I think that the Man above will agree with us. — However, there are not many such unbiassed fishermen as SMITH in Labrador.



Fig. 317. Curing the codfish on board a floater on Queen's Lakes. Photo the author, July 1937.

If possible the split and washed cod-fish is spread already in Labrador, on 'flakes', on branches of spruce boughs strewn on stages so as to allow the maximum circulation of air. If spruce is not available the fish have to be dried on the rocks, Fig. 308, but the result is not so good. Artificial driers are not known on Labrador and yet they would be of the greatest value in this region where unpropitious weather for fish-curing is very common in some years. The best cure is obtained from fish dried on the flakes when the weather has been fine enough to dry them thoroughly but not so fine as to burn them. The produce is known as 'shore-cured Labrador fish' and will be sold to the Newfoundland merchants for export. The quality of the product depends on the size, and the cleanness of the fish, the weather and the amount of salt used, etc. and the whole is divided into a dozen categories according to the market for which it is most suitable (585).

The floaters for the most part carry their cargoes of fish to Newfoundland in a 'green', i.e. salted, state. In this condition the fish is packed down in the hold. If the fish is not plentiful in the sea the whole summer may pass before the schooner is fully loaded and ready to return to Newfoundland. When the worst comes to the worst the fish goes bad; it cannot be appetising to see the men who, when unloading such a schooner, go about up to their knees in decayed, stinking codfish quite unfit for human consumption.

It used to be reckoned that a schooner crew of 8 Labradormen would have an average catch of 1500—1600 quintals salted or rock-dried cod (1 quintal = 112 lbs; 1 »green» quintal = 224 lbs). In the summer of 1937 the yield was



Fig. 318. Schooners in Webeck Harbour heavily loaded with 'green-fish', i.e. cured and salted codfish. Photo the author, July 1937.

fairly moderate and the price then was about $ 2.50 per quintal. — I was surprised to find the prices so low compared with Fennoscandia. Does this result from the smaller size of the fish? Or perhaps it is due to the methods of preparation?

About the middle of September the fish is ready on the heavily loaded schooner, Fig. 318. Earlier it was loaded on board the 'dry fish vessels', where the supercargo inspected it and gave his verdict. Also steamers were chartered to load fish. Each tried to get the first steamer to market and the agents took fish that was not half ready. This was the beginning of bad cargoes, says Smith (862). The fishermen took advantage of these opportunities to ship fish after one day's sun; it saved them a lot of time and work.

Nowadays the schooners mostly return with the catch to Newfoundland, where it is either sold 'green' to local merchants or cured by the families of the

fishermen, Fig. 320. Then the schooner is dismantled for the winter and the crew disbanded. But they meet again the next spring when the traps have to be repaired; by 20th May everything must be in readiness. It is usual to take the same old crew year after year.

Risk is a large factor connected with most of the Labrador fishing; one would say: Their return depends upon the vagaries of the cod and on the skill and assiduity of the fishermen (cf. 585). The true floaters follow the fish. In our days the fishing schooners are found sometimes near Makkovik, sometimes at Mugford Tickle, sometimes at Ramah or even at Cape Chidley, searching for fish. One of the skippers is as good a pilot as ever sailed the coast; he



Fig. 319. Newfoundland floater going home from Labrador. Photo the author, September 1937.

knows every rock over and above the water from Belle Isle to Nain, and all the others follow in his track. It is said with some exaggeration that Labrador is the best nursery for seamen the world ever saw. Thus many of these schooners have to-day no fixed fishing-station but seek their spoil anywhere from the Straits of Belle Isle to Hudson Strait. Prior to the middle of last century these vessels did not often go north of Hamilton Inlet, and not until about 1890 did they generally go north of Hopedale, writes Packard.

Most of the schooners in these days however go direct to the spot of their choice, and most of the men, though living on their vessels, will always be found in the same places. During my journey with Dr Paddon the schooners at anchor marked on his chart were almost regularly found at the spots indicated.

It is quite surprising that the floaters restrict their fishing to the cod species, seeing that the off-shore fishing-grounds are also frequented by the halibut.

American vessels earlier travelled 1400 miles to and fro solely for this fish (325). Nowadays it does not seem to interest the floaters at all.

The number of herring which frequent the waters of south-eastern Labrador is beyond belief. The Labrador herring is perhaps the largest and fattest specimen of that fish I have ever seen. It can no doubt be marketed at good prices. During the period 1860—1880 the herring fishery was also very important, but to-day it seems to arouse little interest. One great disadvantage is that this fish seems to desert the coast in some years or only comes in such small numbers that to catch it yields no profit. — For this work the planters used nets, setting them out in the afternoon and visiting them to take out the fish next morning. The floaters used large seines and it is reported that they have taken in a single haul enough herrings to fill 2000—3000 barrels. The fish must be salted immediately owing to its thick coating of fat to prevent it turning yellow and spoiling.



Fig. 320. Drying the washed 'green-fish' on the wharf at Battle Harbour (536 a).

Bankers.

These schooner-fishermen mostly come from the south-westerly coasts of Newfoundland and are anxious to have the cod-fishing on Labrador rationalised. They fish for the most part in spring and summer on the great banks; hence their name. But, when this fishing is at an end in the latter part of August and the beginning of September and the cod have gone, their schooners generally sail away to Labrador to increase their catch. At that time, however, the schools of fish have also there generally left the shores for deeper water and then the schooners spread their trawls on the off-shore grounds. Their success has often been marvellous.

— It is easy to distinguish the Labradormen from the Bankers when one sees them lying waiting for the wind in a harbour; the former have on the side of the vessel a white-painted, so-called t r a p-b o a t with a motor, whereas the salient feature of the bankers, who use long lines or jiggars, is a d o r y, the light American fishing-boat, for the bankers never use trap nets.

Long use has shown that the shoals of cod on the Labrador coast are apparently inexhaustible. Year in year out the fishery has gone on, and no diminution can be observed, even if one must take into consideration that it is subject to all the vicissitudes to which other fisheries are liable, periods of plenty varying with periods of scarcity. Fish, however, is always to be had somewhere.

Poor years are said to be really rare. The Labrador archipelago and the untouched grounds off that coast allow room for a practically unlimited number of fishing vessels.

Crisis of the Labrador cod fishery

Under the present regime the income from fishing is very limited in Newfoundland-Labrador and it is questionable whether it is worth while in the long run (585, 1033).

The yield in Labrador is mostly of low quality and does not always keep well, and if more salt is used it reduces the quality still more. The quality of the cod yield on Labrador is not comparable with e.g. that of Finmark; it is for the most part very small and exceedingly thin when caught before the middle of August in the middle and the northern part of the Atlantic coast. To this is added the fact that the preparation is primitive and in places careless. The heads and the entrails are simply thrown away at once into the sea. Prichard had good reason to say: the folk of Labrador are entirely predatory people, and the floaters hold the record for predacity!

Perhaps the fish would be better caught later, as for instance nowadays by the bankers, and dried directly as in the Finmark without salt on flakes or 'hjells'. This would perhaps be possible in September and October when the dry land winds prevail. Yet, I have never heard whether such a method has been practised and whether the fish under these conditions also dries before freezing, because in the latter case it would be spoiled.

Possibly the situation could be in some respect improved by using modern methods and bulk handling in a smaller number of centres or floating factories, which should mean a reduction in the unit cost of production. A drastic change in methods of either fishing or curing seems however not probable following Lodge.

The whole catch is rushed off to market as soon as possible with the result that there is always a glut and the returns are small (325).

But here comes another serious inconvenience. There is a formidable difference between the fishing industry in European waters and in Labrador.

The Labrador fishermen, liveyeres and floaters alike, prosecute their calling in much the same way as their ancestors did 300 years ago, whereas the European fishermen utilize an elaborate capital structure in the form of steam-trawlers and drifters based on a very costly share system. LODGE has calculated that therefore the Newfoundlander for his year's work received something less than one-fifth of what his brother on the other side of the ocean received.

Moreover there is one circumstance discouraging for the old time fishery: the chronic overproduction of the fisheries in Europe, resulting in a slump of the prices and especially also on the market where the Labrador fish is sold. The handicap of the European producers is the greater since some Latin nations also send very considerable fishing fleets out to the banks off the colony of Newfoundland.

In a period when the deep sea fishery is gradually being more and more industrialized, and over-production for a market is, and possibly will be, a permanent condition all over the world, with a fall in price since 1929 of 50 per cent, it seems that the kind of fishing practised by the stationers and the Labradormen cannot be made a rational occupation. The Labrador cod-fishery thus appears to be definitely greatly handicapped by the Scots, English, Norwegian and Icelandic fishermen. In one district where the costs of production are unusually great because of the high custom duties, the balance will be decidedly negative. The Labrador fisherman cannot live to-day on the returns he obtains from the fishing alone. Competition with the Norwegian-Icelandic and Scottish-English commodity is not even possible by the application of export premiums and the reduction of some duties to the exclusive advantage of the fishermen.

It may therefore be presumed that this form of fishing will cease of its own accord when it is no longer supported by reduction of import duty and guaranteed minimum export prices ($ 3.25 per quintal in 1939), which will more or less directly favour only the fishermen, says LODGE, who in his character as a former Commissioner of Public Utility in the Newfoundland Commission of Government, has studied the question more deeply than most people (cf. 585, pp. 101 sqq.). Mr. LODGE after his inquiries unsentimentally expresses extreme scepticism as to whether the cod-fishery will ever again be an effective economic mainstay of Newfoundland including its part of Labrador. The government at St John's, however, has at present no other occupation to put in place of the fishing, which therefore continues as a kind of provisorium with great expense to the British Exchequer. The present state of affairs is explained by saying that it is more advantageous to give the relief

necessary to save the fishermen and their families from starvation in the form of industrial subsidies than to take over all the direct expenses for their living (585). The fishermen themselves are of course satisfied, have full confidence in their government's actions and are convinced that providence will once again smile on them, the chosen people.

Social welfare work in Newfoundland-Labrador

is, for a stranger from over-organised Europe, one of the most interesting phenomena of Labrador. Wide views are followed and some highly educated private personalities work for the people's welfare in freedom but with responsibility.

Historical sources from olden times (see bibliography) lead one to conclude that for a long time the people were left to themselves and had to arrange their affairs with each other as well as they could. During the period of French control the governmental powers seem scarcely to have extended their protection to this end of the country. Certainly at times concessions were given to different people in return for exploring the country (p. 480 sq.), but the concessionaires did not enjoy much support or protection from the local authorities. It is not known to the author whether any missionaries were at that time in the country now called Newfoundland-Labrador.

When Labrador was transferred to the British Crown in 1763 the energetic governor, Sir HUGH PALLISER, introduced new methods into the administrative and social spheres, of which we have already seen one example (p. 554; cf. 325). According to the custom of the time conditions in Labrador were still arranged by decree or letter, but with a few exceptions (196) governmental supervision seems to have been almost non-existent on the coast for a very long time. One fact unfavourable to the continuity of the administrative arrangements was the repeated transference of jurisdiction over Labrador from Canada to Newfoundland and back again.

In 1826 the first c i r c u i t c o u r t for civil jurisdiction on the coast of Labrador was instituted. It continued till 1834 when it was found that there was not sufficient business to warrant the great expense, but regular visits were made up the coast. In 1862 the Labrador court was re-established and continued to make annual visitations until 1874, inter alia collecting customs duties. Later it was again reinstituted (325). We may conclude from this that the need for a court did not seem very great, a fact which speaks eloquently for the peaceful and law-abiding character of the fishing and hunting population, as already HIND observed.

Until quite lately both the white and the coloured populations of Labrador have in practice been allowed to look after themselves. They have followed

quite freely their own customs and habits, and as a rule have settled their mutual relations according to their own unwritten customary laws and their inherited ideas of justice. Judges and police have concerned themselves extremely seldom with the affairs of these people. There has been no local representative for the governmental authority, at least during the last few decades, and tradition has succeeded in regulating their lives quite satisfactorily, while they have followed their own principles without compulsion from outside. The only judicial authority to which the natives as well as the white people have sometimes appealed has been the Justice of the Peace, and as such the authorities in St. John's used to appoint one of the Moravian missionaries-in-chief and later Sir Wilfred Grenfell and, since 1913, Dr Harry L. Paddon. Dr Paddon told me that this appointment meant very little work, and during 25 years he had only been obliged to interfere seriously in two cases. Since 1880 no serious crime has been reported (1937).

Junek gives an interesting description of the people's idea of administration and jurisdiction on Labrador's south-eastern coast, and most recently in Blanc Sablon (510). The folk on the southern coast, he says, entertain a vague impression that somewhere there is a government or some controlling body which, when laws are broken or disobeyed, sends out as its representative a punitive ranger. Most of the legalism in this region enters the minds of the people in the form of prohibitions. Judicial and legislative powers cannot be said to be fully conceived by the liveyere; it is a knowledge of officials rather than of laws in the true sense of the word. Civil law comes into play with its violation, criminal law is said to be unknown.

It was not until Newfoundland fell into financial difficulties and was obliged to give up its Dominion rights that the administration customary in the British Crown Colonies was introduced; in 1935 some ten Rangers were appointed in Newfoundland-Labrador also. It is indicative of the people's view of these things that the new officials were received rather coldly; from many quarters they were reminded that formerly the people had managed quite well without police authorities and, in consultation with their Justice of the Peace, had arranged all their difficulties to the general satisfaction. The rangers were personally the kindest people and had the best will to do their duties satisfactorily. In these remarks I therefore like to see a spontaneous expression of the sound social spirit which we meet in these small communities of the wilds. As far as I heard neither the Rangers nor the Magistrate nor the Justice of the Peace had any important business to do after the new arrangement was introduced and up to the time of writing (1940).

For this happy condition of things, however, Newfoundland-Labrador has also to thank two philanthropic undertakings without which the people would certainly not be what they now are: North of Hamilton Inlet The Moravian Mission, and south of it The International Grenfell Association. These have taken a great deal of responsibility for the social education and the welfare of the people. Their altruistic activities are among the most attractive phenomena a stranger finds in Labrador, an outflowing of unequalled human idealism in the midst of the biological primitiveness of a brutal wilderness.

The Moravian Brethren's work.

With some exaggeration it may be said that the *de facto* government of the Eskimoes and settlers (p. 727) north of Cape Harrison has been the Moravian Mission. This »flock of sheep in the snow» as one has called the Eskimoes, would probably long ago have been exterminated in the same way as their kinsmen on the southern part of the Atlantic coast if the humble Moravian pastors had not here taken care of every one's soul and body. The work carried on by the Moravians is not only one of the most remarkable gains of civilization on this coast, but a monument to the Christian mission history in general, and merits close study. The reports of the Moravian Mission in Labrador form moreover a consecutive history of that country since 1752 (652—667). They give the fundamental traits of the country's natural history too, ethnography, natural resources and their utilization, etc. In the annual reports of the Moravians are to be found invaluable records regarding the varying supply of seal, whale, cod-fish, caribou and fur-bearing animals and the consequent effect on the Eskimoes' life. These reports are very extensive; some comprehensive works have been mentioned in the annexed bibliography (5, 128, 187, 188, 189, 205, 224, 396, 449, 471, 533, 554, 555, 559, 567, 647, 695, 758, 761, 786, 787, 787 a, 788—792, 794, 834, 999, 1078, 1078 b, 1081, 1088, 1089, 1091, 1114). The space being limited I can here give only some general indications of the Mission's civilizing work.

Little was known in the civilized world about this remote corner of the earth and its inhabitants before the Moravian Church arrived in Labrador. The few reports brought by returning fisher crews described the Eskimoes as a totally savage people. Indeed the men who landed from the first mission's ship in 1752 were killed. However, by their quiet work and endurance the

Moravians have gradually changed the savages into a humble Christian people, and the life and atmosphere in their villages to-day give a true picture of life in a native Christian community.

Historical notes and founding of the Moravian stations in Labrador.

On July 31st 1752 a small vessel which bore the name »*Hope*», arrived on the Labrador coast. It carried a trading expedition accompanied by four Moravian Brethren for whom John Christian Erhardt acted as interpreter and supercargo. It is believed that they landed near the present Makkovik (cf. 205), took possession of the place in the name of the English King, and thought this to be a suitable place for a settlement. They met there some Eskimoes who exhibited the most evident pleasure at meeting a white man who could speak their language. Erhardt carried on a brisk barter trade with them in the most amicable manner. On September 5th the house in which they planned to stay for the winter was ready and the ship went further north to find new opportunities for trade. Ten days later it returned with the news that Erhardt, the captain and five of the crew who had left the vessel in a boat to trade with a tribe of Eskimoes, had not been seen again. What had happened must probably for ever remain a mystery (205).

In the following year an American whaler visited the place (Ford's Bight in 55° 10′?), found the house and the remains of seven murdered men, which they buried.

Ten years later Jens Haven, who knew the Greenland Eskimoes, made proposals to the newly appointed governor of Newfoundland, Commodore Sir Hugh Palliser with the purpose of obtaining permission to go to Labrador and devote himself to the work of converting the Eskimoes, for which work he had prepared himself. Sir Hugh at once issued the following proclamation:

'Hitherto the Eskimaux have been considered in no other light than as thieves and murderers, but as Mr. Haven has formed his laudable plan, not only of uniting these people with the English nation, but of instructing them in the Christian religion, I require, by virtue of the powers delegated to me, that all men, whomsoever it may concern, lend him all the assistance in their power', . . .

It may be said this is the Brethren's Labrador Mission's certificate of baptism.

Haven was very successful in his first meeting with the Eskimoes (p. 554) and Sir Hugh was greatly pleased with the beginning of his mission. Haven went to England and returned in 1765 accompanied by three of the Moravian Brethren. In Chateau Bay they met some four hundred Eskimoes who had as usual travelled south on trading and marauding expeditions. Shortly after Sir Hugh arrived and through the agency of the Brethren the famous »treaty of peace» between the aborigines (probably the Eskimoes south of Hamilton Inlet) and the English was concluded here.

At the very first and for the successful conduct of their mission the Brethren claimed a grant of 100,000 acres land for each settlement they planned to establish on the Labrador coast, and some other privileges too. In these reservations

which should be the Mission's absolute property, the Brethren should not tolerate any quarrelling or violent competitors trading with spirituous liquors and using brutal lusts. On the Mission's property none should be allowed to stay except during good behaviour. In 1769 the Brethren obtained their grant on their own terms. Furthermore the Missionaries were vested with the authority of a Justice of the Peace.

In 1770 HAVEN arrived with his companions off Amitok Island near Nain. They soon obtained the consent of the Eskimoes to their appropriation of the locality chosen. This locality is to-day called Nain. The work was to begin (cf. for details 205,325 etc.). All plans were truly laid, the settlements were prepared with the greatest care, and consideration was given to every detail. Their houses were set up and the little colony was very comfortably settled for the winter. In the following year Lieutenant CURTIS (196) was sent to visit the settlement, and in his report he gives a vivid and enthusiastic description of the life at the station: a herd of barbarous savages are in a fair way to become useful subjects, he stated.

The Eskimoes were nomads and moved from place to place on the coast in pursuit of seal and caribou. It was impossible for the missionaries always to follow them, and when the nomads got out of touch, they used to return to their old habits and superstitions. For these reasons some other centers had to be established, where the missionaries and the Eskimoes could live together in winter. In this way stations were successively set up in Nain (1770), Okkak (1775), Hopedale (1781), Hebron (1829), Zoar (1865), Ramah (1871), Makkovik (1900) and Killinek (1904). Zoar, Ramah and Killinek have since been abandoned. Everyone who understands something about the industrial life of the Eskimoes must express his admiration of the excellent choice of the places for the settlements.

Each station has a church, a store, a dwelling-house for the missionaries and workshops for the natives. Around this fixed settlement the nomadic Eskimoes built their small wooden winter huts.

Each station has a missionary, the »House-father», as he is called, with his wife and children. If the number of the Eskimoes make it necessary there is an assistant too. There was earlier also a store-keeper, who was a layman, and attended to the business of the store.

For a man from a better abode the natural surroundings of the stations are poor and not inviting. The storms and cold are much the same at all these villages, differing only in degree, and with the presence of protective trees and sunshine.

STATIONS.

The most northerly of the Mission stations, Killinek (Port Burwell), on the north-easterly tip of the Labrador, was a good place for walrus, white whale, and seal. It was however abandoned a few decades ago. As appears from Figs 80, and 342 it lay in the most godforsaken wilderness imaginable; it is merely rock and water, not a bush is to



Fig. 321. Looking south-west over Hebron. The harbour and settlement somewhat to the right from the centre. The long house is the Mission station (cf. Fig. 323). Beyond is the Hebron Fiord, its mouth to the left. Aerophoto the FORBES-GRENFELL EXPEDITION, 1931.



Fig. 322. The harbour and wharf at Hebron. In the foreground is seen the banded gneissic rock, i.e. 'roots' of the Archaean Labrador mountain chain. Photo ALEXANDER FORBES, 1935.

be seen, not even a blade of grass which would reach to the knees. Driftwood and train-oil are the fuel. It was bleak and dismal, raining and snowing by turns in the height of summer, misty and raw even in August, with few blades of grass to relieve the sullen greyness of rock. It was surely the most forbidding village of Labrador. Communications were precarious because of the drift ice and strong tidal currents of which the amplitude sometimes reaches a height of 35 feet (cf. 989, 478, 400, 403).

The station Ramah was a pretty little village set among the high hills along the shore of a small and rocky bay, Ramah Bay. A few score yards



Fig. 323. The combined church and mission house at Hebron. Photo HARALD LINDOW, 1918.

behind the buildings the cliff rose steeply, and the roar of avalanches was not unknown. It was but a cold and stormy spot with fierce winds and heavy snowstorms. The bitter experiences of famine caused the people to desert this station. Famine in Labrador? This seems extraordinary; but it often happened that in spring when the Eskimo went out in their kayaks to catch seal the hunting failed because of the heavy drift-ice (472, 476).

The station at Hebron is like the two former situated outside the forest limit in a desolate area, Figs. 321, 322, 323, but favoured by the Eskimo because it is only some miles from the ocean and the catch is therefore very welcome. For a long time in the 19th century it was the chief point of contact with the natives.

The station O k k a k was the prettiest of the villages. It lay at the head of a sweeping inlet surrounded by high hills of which the grim slopes have patches of green where the coarse grass and the stunted bushes struggle for life. Below, its neat church tower, its white-painted Mission house and store set in a cluster of small wooden huts where the Eskimoes lived formed a rare sight for eyes weary of the sea, says Dr. HUTTON; Fig. 324. To the mind of the Eskimo Okkak was a fine place because it was a good centre for hunting and fishing. Scenery for its own sake does not appeal to them very much; Ah! they say, bears and foxes in that forest: fine place for hunting! In the bay the



Fig. 324. The abandoned Eskimo village of Okkak, where the Spanish flue killed 216 members of a population of 310 in the autumn of 1918. Photo HARALD LINDOW, 1918.

codfish feed, in August you may pull the great fish out of the water as fast as you can let down your line. Outside the coast, at the *sîna* there is in winter time plenty of seal and sometimes walrus.

Since the tragic ravages of the Spanish influenza in 1918 (p. 459) the place has been deserted and now lies ghostly desolate. Some who survived have formed a little community called Nutakk a little to the south on the same island (cf. 472—478).

The station N a i n, Figs. 325, 326, 199, 236, 238, 239, 195, may be considered the capital of Eskimo Labrador. It is a pleasant place, more civilized than the other stations of Labrador, and more frequently visited by ships in the summer than the other northern stations. It was for a long time the seat of

the Moravian Bishop of Labrador and the German Consul. It lies at the head of a little bay, nestling at the foot of steep hills that make a half circle around it. The climate is much pleasanter than that of the stations nearer the open ocean with its arctic maritime influence. The grey slopes are splashed with green and it has been possible to plant small vegetable and flower gardens near the houses. The trim white Mission house and church, a long line of grey



Fig. 325. The Reverend P a u l H e t t a s c h and his son and Assistant-Missionary. In the background Nain (536 a).

Eskimo huts and the jetty make a very pleasant picture of the little settlement. The main street winds along the water-line, and one gets the idea that some of the huts have tried to elbow their way to the front between their neighbours: it means much to an Eskimo to live in the front line; at high tide his boat can come to his door and in winter the great broad road — the frozen sea — lies flat before him. On the hillside there is more room and the huts stand in solitary ones and twos. The huts are handed down from one generation to the next, though tumbledown and half covered in snow (472, 474, 761, 475, 478).



Fig. 326. Nain, looking from the south. In the foreground on the wharf, Hudson's Bay Company's store houses, and behind them the two houses of the Moravian Mission. In the house farthest to the left live the Hudson's Bay Company's staff. Photo Alexander Forbes, Aug. 1935.



Fig. 327. Hopedale. The large buildings near the wharf are those of the Moravian Mission and the Hudson's Bay Company. Beyond are the homes of the Eskimoes. At the left edge, near the shore was the old Eskimo igloo-village (Fig. 235). In the foreground lies the famous park. The small island is crossed by two diabase dikes. Aerophoto the FORBES-GRENFELL EXPEDITION, July 1931.

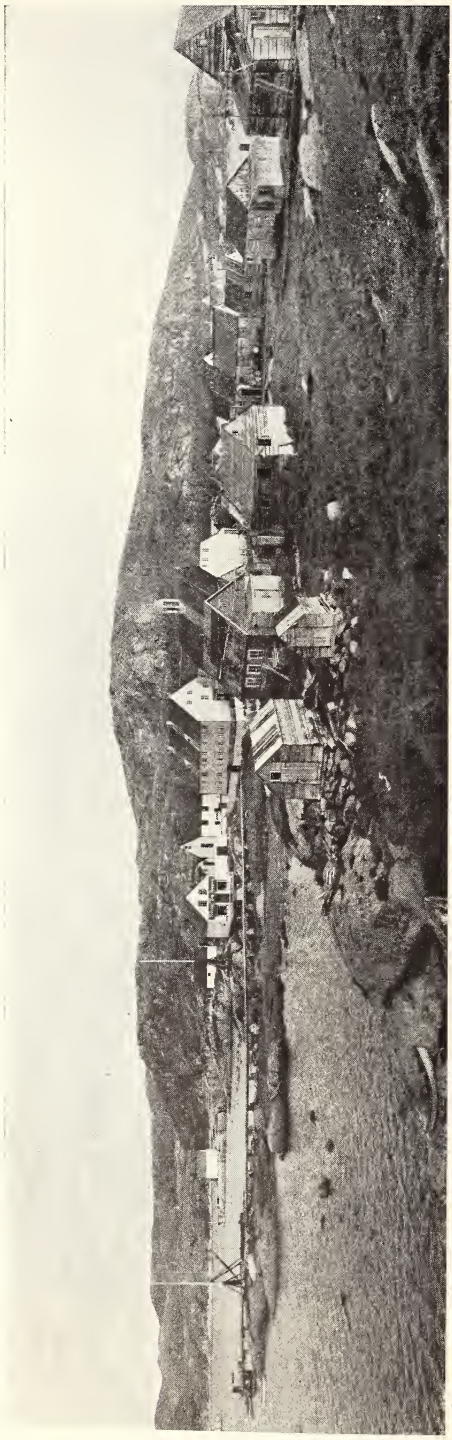


Fig. 328. Hopedale, looking from the east (536 a).

The station Zoar was abandoned some decades ago.

The Hopedale Station — Figs 237, 168, 327 and 328 — was originally set up to make contact with the Indians who used to come in groups to the coast there (cf. p. 482). The Eskimoes then feared them so much that they fled at the first glimpse of one. In 1790 CRANZ says the fear began to decline and several Naskaupee families came to Kippekak to trade with the European factories there, 20 miles from Hopedale. In 1799 the missionaries had some talk with a few Indians who had been converted by a French priest; these had greatly feared the Eskimoes. The Indians came no more to the mission.

According to an old diary this station was founded where the first tent was pitched in 1752 to establish a mission. Numerous foundations of Eskimo igloos, earth huts, and the remains of three great-family peat houses half a kilometre north of the station prove that Hopedale was early an Eskimo centre; cf. Fig. 235. Hopedale is now a mission and trading station of considerable size and visited in summer by the mail steamer or a schooner carrying the mail. Nature there is less friendly than in Nain, it

is visited by the same snow storms and blizzards as the northern stations and hemmed in by the same frozen sea in winter time. But there is a little wooded park in Hopedale (478).

M a k k o v i k is the most southerly of all the Moravian Mission stations on the Labrador coast and was established to look after the half-breeds and some white settlers who, in varying numbers, began to inhabit the surrounding islands. Makkovik lies in a well-wooded bay, Fig. 329, and is seemingly a good place for the hunter, though better for the trappers of fur animals than for the hunter of seals. The church here was planned and made in sections and then shipped out and put together in a pleasant spot. At Christmas 1897 the first service was held in the new church with a temperature of 47° C of frost outside. The boarding-school at Makkovik has become one of the most valuable parts of the Mission's work among the half-breed settlers and the Eskimo. The pupils come from far and near, not a few are Eskimo, but most are children from settlers' homes and there-



Fig. 329. The Moravian Mission station at Makkovik, looking from north-west (536 a).

fore English is their native tongue. Some young Englishwomen are teaching the children what they need for their future life as sons and daughters of Labrador: they shall be good and loyal citizens and good and loyal Christians (478).

Spiritual and temporal work.

The missionary's difficult and complex task required wisdom and patience. It is scarcely possible for him to have permanent control of such children of nature only with the ten commandments and philanthrophy, especially when they live in such a wild state and in such isolated, peculiar social conditions as the Eskimo on the Labrador coast. He was obliged to show interest also for the temporal welfare and ways of living of his charges in order to win their lasting devotion, and even in that sphere show himself superior to them. Yet he had to keep the spiritual apart from the temporal.

The first task of the mission was to try to tame the minds of these wild people and modify the barbarian, almost asocial habits which seem to have been specially characteristic of the pagan forefathers of the Labrador Eskimo. For this purpose it was necessary to win their confidence, a none too easy task. Even the old Nordic sagas speak of the white men's savage behaviour to the S k r a e l i n g s — Eskimoes — and in the brief history of the coast the evil white man has played a conspicuous role by his iniquities among the aborigines. But the loving work of the missionaries wrought a miracle. They looked after the poor, gave food to the helpless and disabled, cared for the sick and helped to bring up the children. In spite of great difficulties at the beginning the Moravian Brethren have really been apostles to the Eskimo in Newfoundland-Labrador. By means of great sacrifices of life and goods they have won a brilliant victory over the barbarous paganism of olden days. Cf. Dr Hutton's penetrating descriptions.

Moreover they have taught the Eskimoes to continue to provide for themselves, to remain Eskimoes, keeping to their ways of living as adapted to the surrounding natural conditions. This was very important for the mere existence of the race.

At the beginning of the eighteenth century the southern Eskimo were trading with French fishermen and settlers in the Straits of Belle Isle region, and since that time their desire for European goods has been intense. The practices of these traders were not humanitarian and no idea of mutual benefit entered into their calculations when trading with the Eskimoes, Gosling notes: Rum and tobacco soon became the chief articles given in exchange. To

preserve their flock from this contaminating influence the Moravians started trading. If they not had begun the trade for the benefit of the Eskimoes themselves and for the support of the Mission, the people would have flocked south and would have shared the fate of the tribes that once inhabited the south coast (p. 482 sq.). The traders began to push up the coast in increasing numbers in the nineteenth century, 'spreading spirituous liquors, quarrels and brutal lust among the natives'. How far-sighted HAVEN had been when he reserved areas for the Mission and the authority of the Justice of the Peace! In another respect too the trading was an advantage. Many times both Eskimo and missionaries had to live on the verge of starvation. It was therefore a great blessing to the community that the policy of the Brethren was to keep in hand a year's supply of all necessaries, fearing some such contingency as that the mission ship would be wrecked.

DAVEY (205) has given a comprehensive and fascinating picture of the Brethrens' spiritual pioneer work (cf. also the bibliography).

At Nain Brother DRACHARDT preached his first sermon in 1770 to an assemblage of about 800 people. Long periods of probation were, however, necessary before they could consider the applicants genuinely converted. In 1776 for instance they adjudged a man to be worthy of baptism, but in 1789 he relapsed after a visit to the south: he took to himself two or three wives that he required to man his boat. He finally left the settlement. The temptation to travel south in the summer remained for years. The goods the white traders there offered in exchange were most attractive.

At the close of the eighteenth century, after thirty years of administration, there were in the Moravian settlements 85 persons professing Christianity. At this period twenty-six missionaries had been employed. This may show the difficulty of their task.

At the beginning of the nineteenth century the efforts to convert the Eskimoes had not been very successful. However, after the conversion of a noted Eskimo sorcerer 1804 the Brethren's work began to bear fruit. In 1824 KOHLMEISTER reported that Nain and Hopedale were practically Christian settlements, but Okkak was still a mission among the heathen. The missionary REICHEL stated in 1861 that of the estimated number of 1500 Eskimoes living on the Labrador 1163 were under the influence of the Moravians, if not all actually converted.

Through long years of patient labour, unpraised and unrewarded, the Brethren gradually won the Eskimo population to the Christian belief, civilized and instructed them and preserved the race from extinction. At the close of the nineteenth century there were only some thirty pagan Eskimoes in the far north. In our day there are no pagans at all.

The psyche of mankind is, however, in many respects an enigma. How difficult it is to root out the superstitions or to change the customs of long ages! The missionaries could give many instances of how still to-day superstition temporarily gains the upper hand. Sorcery lingered long among these people of nature.

In the fishermen and the traders the Brethren had, however, to face a more insidious enemy than the Eskimo sorcerer, the *Angekok*.

It has been suggested that the Mission could scarcely have reached such thorough and brilliant results merely by spreading Christian teaching only among the primitive pagans. The very simple old customs of the Moravian Church were continued and soon took firm root among the Eskimo, it is true. But there was nothing in the Moravian church's ceremonies and external customs to fascinate the Eskimoes in the same way as the Catholic Mass caught the fancy of the Montagnais (p. 606); the Moravian missionary does not even wear a black coat and a clergyman's collar or anything like the 'robe noir' of the Indian missionary, and in winter he wears Eskimo clothes of the Eskimo cut which are warm and convenient for the bitter weather. Therefore it is probable that it was indeed the power of the irreproachable example and purely practical knowledge which the Missionaries gave to their charges that in this respect contributed so much to the miracle of conversion.

It is of course the personality of the teacher which wins the ear and mind of the audience as much as the doctrines he puts forward. The Moravian missionaries in Labrador were men of kindly, understanding hearts and of deep piety, but at the same time men of wide culture. They were also well informed on many practical subjects; this latter fact greatly attracted their charges. Many of the missionaries were skilful masters of some useful handicraft, one might say Jacks-of-all-trades: doctor, surgeon, dentist, architect, gardener, poultryman, electrician, engineer, painter, plumber, tinsmith, blacksmith, baker, carpenter, upholsterer, etc. etc. *ad lib.* Nor must one forget tailoring and knitting, translating and teaching. They can mend a motorboat, fashion a boat, indeed turn their hands to most things with success.

Their wives, the Moravian Sisters, teach the native women to clean, cook and do various kinds of work. They tend the sick and nurse those suffering from disease. Earlier they had also to help in the schools. When the work of the day was over they joined their husbands in teaching the settlers' children. The more things they could turn their hands to, the better were

they able to have a comfortable house and a little pleasure in life, and the more respect they earned from the natives (478, 761).

This life is thus not less trying for the missionary's wife than for her husband. These noble ladies bear their children and tend them through illness, usually without medical aid. At seven years of age their children are sent home to the mission schools; this often means the practical separation of parents and children for a lifetime; how can father or mother hope to find their old place in their child's love and confidence after ten years of absence? PRICHARD asks with good reason. Even communication with home is restricted at most of the stations to one or two mails a year. Their boys and girls will be on the threshold of manhood and womanhood before they next see their parents. Self-abnegation can scarcely go further; nothing but the strongest sense of duty and a deep piety can enable them to carry on their noble work on the Labrador, HUTTON wrote.

The Brethren generally spend the whole active part of their life on the coast; that is some thirty to forty years. This life of devotion and exile has a few breaks, as for instance when once in ten years they return to their homes in Europe on a visit. But under these conditions the missionaries learn to know thoroughly the life of their charges and its demands on them, also the psyche of each individual which, combined with their good knowledge of the language, makes it possible to get very close to them. They lose themselves in the absorbing interest of their work and are ever ready with sympathy for the shortcomings and sorrows of the people. In this lies the secret of the missionaries' unparalleled success. The missionary loves the Eskimoes and they love the missionary; all day long a stream of folk throngs the steps of the Mission house during the great festivals.

In general the Eskimoes of our days are very religious.

During the season of open water the attendance at church services is comparatively small, for the Eskimoes are away at their hunting and fishing places, perhaps twenty miles or more from the village. A good number of those who are nearer come by boat for the Sunday service or the religious festivals: then hardly anyone stays at home, the church is packed. There is a dignity and sincerity over the whole service. The missionary has the people well in hand and they listen eagerly to what he has to say and read. The organist plays and the community join lustily in the hymns in perfect tune and stately time. Every eye is fixed on the speaker (476).

The winter time from Christmas to Easter is a very busy season for the missionary. Daily services, school, confirmation classes, festivals and mis-

sionary journeys; besides being 'at home' to the Eskimoes at any hour of the day to hear their complaints, their troubles, temptations, and struggles. The Eskimo is said to turn to his missionary with the same feelings as a child to his father, and he gives him a few sympathetic words. Often in the end it all amounts to very little, but the natives feel the need of opening their hearts and of having a good talk; some of the apparently trivial things are possibly mountains in the Eskimoes' lives, and they wish to sit and cogitate over them. The missionary must indeed look after everything in the public life of the Eskimo: he must baptize him, teach him, be his representative when proposing marriage, he must marry him and he must bury him. Added to that he must comfort him when he is terrified by the powers of darkness. Further he must look after his worldly business, if in silence yet still to his advantage. If necessary he must give him medical care. It is about as much as a man can manage (478).

The missionary has, however, also to visit the scattered families and it is no enjoyment to travel in winter time, plodding along on snow-shoes in front of the flagging dogs, or helping the heavy sledge over frozen brooks, sleeping on the hard floor of some lonely hut and subsisting on the frozen food (476).

Success of the Moravians' civilizing work.

The missionaries' school-teaching has been most successful. It was reported already in 1801 that many Eskimoes could read tolerably well (cf. p. 558 sqq.). The first book printed in their language — a history of Passion Week — was said to be eagerly studied and read aloud in their homes. In our days there are at least some 22 books printed in Labrador Eskimo. As far as I know all Eskimoes under the Moravians' control can read, write and reckon to-day. They were taught sloyd. The culture of the home was developed in a more hygienic form (p. 521). The Eskimoes' love for music and singing was observed and developed by the missionary very early. In 1828 Okkak was gladdened by the present of an organ. Later on they began to play instruments of various kinds, and were even able to form both brass and string bands (p. 568).

A better way of living was introduced by means of new ideas. The Brethren taught the Eskimo to catch cod; they bought their catch in summer and sold it to them again when they were most in want and almost starving; in this way the people gradually learned the value of cod-fishing. As early as 1806 the Mission introduced seal nets as they were in use on the south coast, and in this way the supply became more regular. The trapping of fur-bearing animals was encouraged long before the Hudson's Bay Company settled on the coast.

The most important means by which the Eskimo's standard of living has been raised to meet the demands of the time has been trade. As mentioned above it was necessary to preserve the natives both from exaction by the bootleggers and from falling into a kind of economic slavery to the traders who knew only too well the different forms of the truck system. This proved possible by the missionaries themselves controlling the trade. The trade done by the mission was thus of great value to the Eskimoes. To the Mission itself on the other hand it brought many a troublesome hour.

The Eskimoes, and in later times the settlers, brought their fish, furs, sealskin boots and other articles of barter to the mission's store and could there provide themselves with salt and different kinds of necessary gear for fishing and hunting, provisions, garments, in fact all the supplies that they needed. The prices paid were fair and even liberal. In the case of valuable pelts such as silver and black fox the storekeeper paid a deposit at once and when the skin had been disposed of on the London market, he passed over the whole amount obtained to the hunter less a small percentage. The possession of a round sum of money was not of the same value to the Eskimo formerly as it would be to-day. They soon spent it in making useless purchases from the schooner-men who traded along the coast in summer. It therefore happened that for instance a man who had drawn 300 to 600 dollars applied to the Mission funds two or three months later as a starving pauper (761).

The mission has often been criticized because of the trade it carried on. These animadversions are however unjust. The whole proceeds have been devoted to the upkeep of the Mission and have rarely been more than sufficient to defray the heavy expenses incurred by the trade (cf. p. 531 sqqq.). If the Mission had not had shops the people would have been obliged to tramp perhaps double or treble the distance to some private trader, with the added temptation of finding it possible to buy undesirable things. One of the foremost experts in this matter regarding Labrador, Sir WILFRED GRENFELL, states that the Moravian Mission stations just as trading posts have been of enormous importance for the welfare of the people.

Now, there is one unfortunate circumstance: jolly people generally live above their income, and the sly and speculative Eskimo are no exception to this rule. It was not long before the majority of them were in debt to the mission shops. Theoretically there should be no bad debts, but gradually the debts accumulated. The Mission's trade was undertaken principally in the interests of the Eskimo. It has also kept them together. But there was nothing else to be done from time to time than to cancel their debts and then start again with a clean sheet. The credit system was finally refused to those

who made no effort to pay their debts; after a while even the Eskimo admitted that the new rules were founded on justice (761). This form of welfare has of course been disapproved by traders and many others. Meanwhile GRENFELL has definitely and successfully met all the superficial and egoistic criticisms which they and other occasional visitors have expressed concerning the high prices of goods, etc. (cf. 364).

In one other respect too the trade was not always advantageous for the natives. With the policy of 'the open door' the Eskimoes developed demands hitherto unknown amongst them. As early as 1861 REICHEL remarked that few families were then content with the food that had satisfied their ancestors. Molasses, sugar, biscuits and other white man's foods had become almost a necessity and were then principally obtained from the fishing schooners or the traders (cf. p. 533 sq.). The Mission did not succeed in completely preventing the traders' smuggling.

In these days when journalism flourishes criticism is often more plentiful than founded on fact. Opinions are expressed in many quarters regarding the results of the Moravian Mission's work. Some who express unbounded admiration for the primitive freshness and ethnological characteristics of the natives do not hesitate to criticise this 'taming' of the Eskimoes. If, however, it is remembered that the original Eskimoes in Labrador very much resembled the gipsies of the Old World and therefore not only lacked social organization, but also seem to have been rather asocial and practically speaking amoral any thinking world citizen may be thankful for the educative work which has been done in this forgotten corner to raise the level of these people so highly gifted by nature. The statement often made by chance passengers that the Mission was injuring the Eskimoes' way of living and earning capacity by persuading them to live in settled dwellings, only shows complete ignorance of the Mission's purpose and the life lived by the Eskimo at the present time (p. 561). Similarly wanting in knowledge has been the criticism of the Eskimo's schooling. The blessed instruction both on the school benches and in practical life has undoubtedly facilitated the adaptation of these people to the Euro-American form of culture, and aimed at making their unavoidable transference to it as painless as possible (cf. KNUD RASMUSSEN p. 562).

The positive advantages have been incontestable. Through the Moravian missionaries the Eskimo have been preserved from extinction, have been civilized and educated and brought to a knowledge of their Creator, GOSLING wrote. One of the sailor veterans on the coast, NICOLAS SMITH (862), a Labra-

dorman, writes: To those missionaries who have served in the past and to those who are carrying on at the present time I desire to pay tribute for their self-neglecting work for humanity. The effect of the Moravian Mission on Labrador has been very profound, more so than is apparent to the casual visitor, writes FORBES (275). The Moravians have solved a hard and dangerous problem and deserve full credit for the happy relations that exist to-day. SIR WILFRED GRENFELL's opinion is: 'To no other people on earth does the lonely Labrador owe one-half the debt it does to these devoted servants of the Moravian Mission.' And the charitable work carried on by SIR WILFRED himself in Labrador has made his word decisive in this matter.

Let us now glance at SIR WILFRED's own work.

The International Grenfell Association's work

for the well-being of the people of the Labrador Coast.

The Moravian Brethren did what they could even for the large floating white population which visited the Atlantic coast and the liveyeres. But they could not do very much for them; the Eskimoes were their particular clients. Fortunately the liveyeres and the visiting fishermen found a champion in Dr. WILFRED GRENFELL, who in 1892 started a new era for the white population of the Labrador coast. For the missionaries in the north too, this grand philanthropist was a powerful ally.

Before his arrival a floating population had gradually invaded the coast: fishermen, furriers and traders. The western part of the Straits of Belle Isle had been to some extent settled from the beginning of the nineteenth century and the white people had advanced as far north as near Hamilton Inlet. Not before 1860 did Newfoundland fishing-schooners more generally reach Hopedale. But in 1863 they were at Hebron and soon they sailed up to Cape Chidley. The business grew rapidly to some 1500 to 1800 schooners with 15,000 to 20,000 people about the year 1900. With them came many troubles, diseases and abuses.

ORIGIN AND PURPOSE OF THE ASSOCIATION.

In England rumours were soon heard of need and disease in Labrador. It was expected that the fishing population there was in want of the same aid and support as that given to the North Sea fishermen by the »Mission to Deep

Sea Fishermen». For this purpose Dr. GRENFELL was sent out to investigate this matter.

Dr WILFRED T. GRENFELL was born in Scotland 1865; Fig. 330. He was appointed British Medical Officer to the 'Royal National Mission for Deep Sea Fishermen'; the task of this association is to improve morally and physically the condition of the North Sea fishermen, partly by giving them medical care, partly by protecting them at sea from victimisation by bootleggers and cardsharpers and other kinds of exploitation — the so-called bumboats. After his first training in the North Sea he was sent out in the Mission's ship in 1892 to Labrador to investigate the conditions.

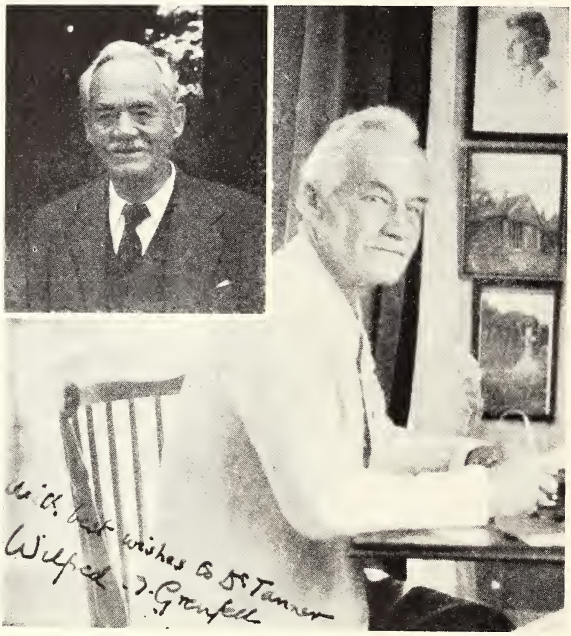


Fig. 330. The late Sir Wilfred T. Grenfell, surgeon, navigator, Justice of the Peace and philanthropist, the founder of the *International Grenfell Association*, at his work-table. The inserted picture taken by the author at Woods Hole September 19th 1939.

Dr. GRENFELL found the white population, both resident and floating, in the greatest need of help. Long years of isolation, privation, ignorance and neglect had reduced the residents of the country to the depths of misery (325). He was deeply impressed by the terrible poverty, the almost permanent half-starvation which prevailed among many, the wretched habitations, the total absence of the simplest sanitary ideas, the ignorance and apathy of both sexes living from hand to mouth and burdened by the truck system. All this formed a vicious circle from which the people could not get away with their own power. What remedy was there for this evil? To move them into a country with better conditions?

Poor people become extraordinarily attached to their homes, unattractive as they may appear to inhabitants of more favoured countries. The liveyeres of

Labrador are no exception; they will not leave for places where they could earn a livelihood and be in touch with civilization. I know trappers in Labrador in an excellent financial position, who after some years' experience in the States have returned to their former homes in Labrador's freedom and rugged wastes. We have found some of these families living in a rough kind of plenty (at Sandwich Bay and North West River), whereas the greater number living near the coast northwards up to Makkovik and Hopedale are only just above the poverty line. But the margin easily disappears: an accident, illness, bad fishery or unsuccessful furring can plunge an independent family into the direst poverty from which they cannot extricate themselves unaided. Who does not know the coast cannot figure what poverty is. GRENFELL tells us that in 1909 he found a family on an island in Hamilton Inlet living in an absolutely destitute condition: the mother of Scottish descent, the father a half-breed Eskimo and five or six children. They were half-clad and had no provisions, they had neither gun, nor axe, nor fishing gear; yet the children seemed to be in fairly good condition; they lived on berries. GRENFELL took several of the children to his headquarters in St. Anthony and he helped the family to make another start in life. This is only one of the stories of fantastic poverty; in GRENFELL's books we find others. I have myself had the opportunity to travel with the hospital boat for two weeks along the coast and I was surprised still to find so much and such varieties of disease and accidents among the 'floaters' after nearly forty years of devoted charitable, surgical work. I was astonished to find how many weak and sickly folk there were on the coast, and I could now realize for the first time how terribly bad the people's health must have been (tuberculosis, beriberi, anaemia, avitaminosis) before the start of GRENFELL's work.

Moreover the liveyeres along the outer coast are still few in number and live so far apart that they can afford each other but little support. The medical and social need of this population is still crying; what can it have been when GRENFELL began his work! The only settled practising surgeon on the Atlantic Labrador coast is said to have been an Eskimo living in Hopedale. In summer time a doctor, who travelled up and down the coast on the mail steamer, supplied them with some medical help. This was naturally ineffectual, and if people got seriously ill they just died (325). There had been no one to look after the interests of these poor people: floaters and planters; no magistrates nor police lived on the coast. They were an inarticulate group when GRENFELL came to their rescue.

Dr. GRENFELL had already gained an extensive knowledge of the sea, and this specially enabled him to take up the work in Labrador. He soon procured

also a master's certificate and has since pursued the higher study of nautical science, even to the making of charts and accurate surveying. For this reason he could also act as agent for Lloyd's for the coast of Labrador, and has been able to bring to justice several notable offenders.

For lack of business the Circuit Court for Labrador (p. 764) had gone out of existence a generation before GRENFELL came to the coast, and it had not been found necessary to have even a policeman stationed there (before 1935). GRENFELL therefore soon became a magistrate for the coast. His duties were happily not onerous, the inhabitants are not a vicious people, as we have already seen. Quarrels about trap berths formed the bulk of the cases brought before him. They were settled by him with prompt justice. One of his achievements was that the liquor traffic was practically suppressed; in his position as magistrate he eagerly hunted out every offender.

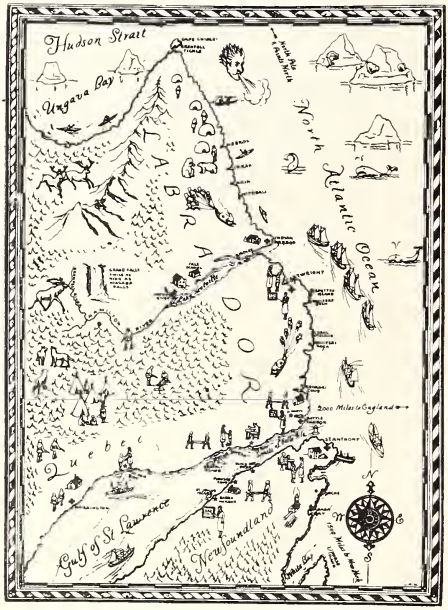


Fig. 331. The salient features of the International Grenfell Association's activity presented about 1935 by a 'whop', i.e. one of the volunteer summer workers of the Association.

Dr. GRENFELL decided to found an international association for the welfare of the Labrador people as a result of recognizing the handicap under which the people lived. This plan has been realized with rare success. Large voluntary contributions have streamed in. In 1939 the staff comprised a hundred persons, including voluntary workers. The Association's vessels now sail under their own, internationally recognized flag.

On the schematic picture, Fig. 331, drawn by one of the »*wops*», i.e. a voluntary summer worker in Labrador with the International Grenfell Association, one will find the salient features of the *I. G. A*'s philanthropic work on the coast. We cannot here enter into details, but I will give some indications as far as the Newfoundland-Labrador coast is concerned. For details the reader is referred to the literature (235, 338—382, 390, 428, 504, 560, 566, 615, 717, 719, 721—730, 732, 733, 734, 739, 747, 897, 938, 987, 988, 991, 1039).

Medical work.

Two or three hospital ships patrol the coast all the summer. They go from their base in St. Anthony up to Hopedale, sometimes, if time permits, even to Hebron, and visits are regularly made both to the harbours and the schooners at their anchorages at out-of-the-way places as well as to the liveyeres and the planters, giving them medical relief if needed, carrying their mail, etc. The principle is to help the fishermen not to lose time on superfluous voyages. In difficult cases of illness which need special care or operation the patients are taken to one of the hospitals for treatment, where they can be better attended to than at sea. The appearance of the hospital ship »*Maraval*», the »*Strathcona*» (Fig. 104) and the other Grenfell vessels has been a source of much thankfulness and joy in many a lonely harbour.

In winter time the doctors visit the liveyeres, travelling with dog teams all along the coast up to Makkovik, where the Moravians' sphere of interest begins.

At Okkak alone a Moravianh ospital has been at work some years (363, 472—478); it has had to suffice for a population dispersed over some 300 miles of coast. But there was no health patrol along the coast. Considering the bad communications there were of course many cases in which patients were compelled to wait for weeks, or perhaps months, before help or alleviation could arrive. However this hospital, a gift of charity, could not be sufficiently highly esteemed, because they had had no real medical assistance before (761).

We find now on the coast the following h o s p i t a l s with modern equipment, of which five are still in use: North West River (Fig. 292), Indian Harbour (abandoned in 1939), Cartwright (Fig. 332), St. Mary's River (Fig. 333), Battle Harbour (burned in 1931 and abandoned), Harrington and St. Anthony.

Besides these there are small cottage hospitals called n u r s i n g s t a t i o n s in use during the fishing season at Indian Harbour, Spotted Island, Boulters' Rock, George's Cove, Red Bay, Forteau, Mutton Bay, Flowers' Cove, Black Duck Cove and Conche. They are operated by a staff of trained nurses working under the direction of a doctor, and these give the sick and injured excellent first aid.

The doctor however spends most of his time visiting the different stations, harbours and other settlements, travelling in one of the hospital ships belonging to the Association. During these journeys health propaganda and the care of children is promoted both by practical treatment and the distribution of literature. Some support in the form of wholesome food, especially such as contains vitamins, is given in large amounts and gratis to the poor and sick.

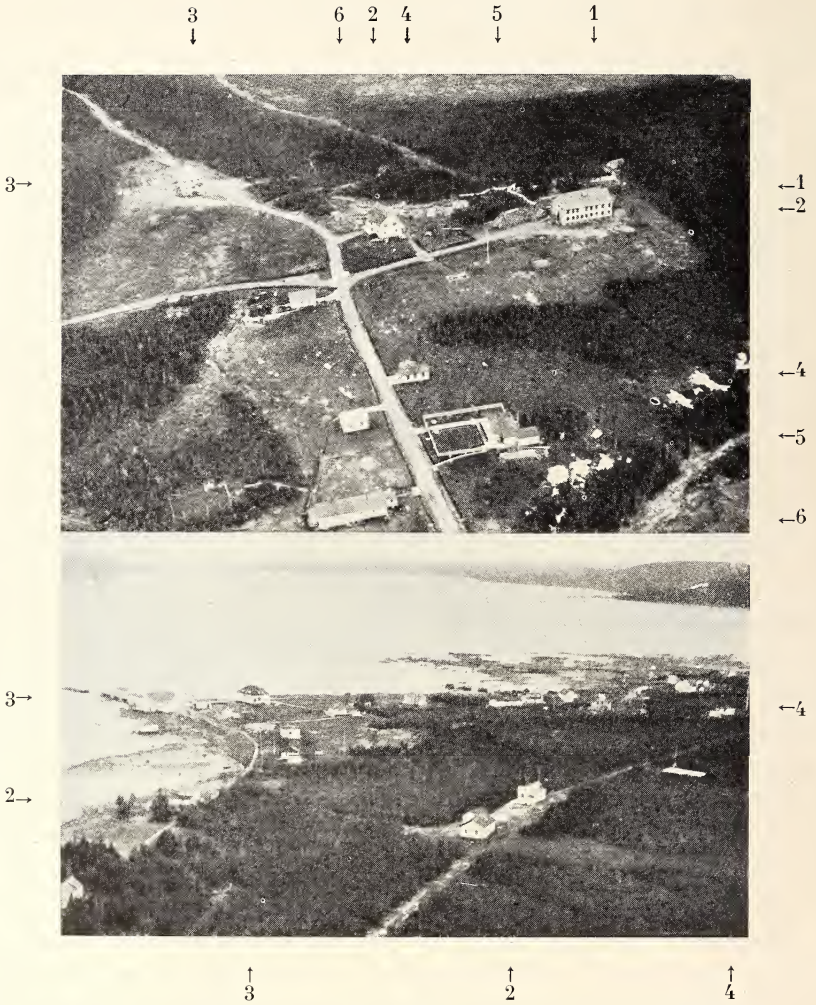


Fig. 332. 'The Grenfells' at Cartwright (upper picture); to the left the hospital (3) to the extreme right the school (1) the industrial shop (4) Mrs Keddie's house (5) and Dr Forsyth's house (6). The Cartwright village (lower picture); on the headland to the left the Hudson's Bay Company's houses (3), in the foreground to the right the Church of England church (2), to the extreme right the wireless station (4). Aerophotos the author, July 1939.

The great importance of these establishments is easily understood when I mention that the absolute state of health in the country is alarming, especially the incidence of tuberculosis. In 1937 7 % of the population of the colony Newfoundland were found to have active, progressive pulmonary lesions. The

infected population, however, shows the most surprising resistance; they are only very slowly succumbing to the scourge; somehow or other they must develop their own immunization. The annual death rate for the period 1932—36 was about 12.7 per thousand for Newfoundland including Labrador (585).



Fig. 333. The Grenfell hospital at Mary's River (536 a).

The distances are long, transportation difficult and the visits made by the itinerant doctor or nurse are still perforce insufficient. From Belle Isle Straits to Hebron, is a stretch about five hundred miles in length as the crow flies. JUNEK, after having studied the community of Blanc Sablon very closely, states that the educational and clinical work accomplished by the Grenfell Mission is meagre, sporadic, and most ephemeral in its influence upon the lives

of the people. It must be enlarged. In the absence of such aid the people resort of necessity to their own local remedies. On the whole the most important of these is resignation and fatalism. The Association will undoubtedly find a remedy for all these evils if only it can continue to obtain the necessary funds and trained assistants.

Educational work.

Besides the purely medical work the Association also carries on charitable and educational work.

Children of poor parents and orphans are taken into homes where they are carefully tended by qualified nurses and taught weaving, carpentry, etc.

The public education (except on the coast north of Hamilton Inlet where it is under the Moravians) is entrusted in the main to the Association. There are now modern schools with boarding-houses attached in North West River, Cartwright, St. Mary's River, Red Bay, Forteau, Mutton Bay, Flowers' Cove, and St. Anthony. Access to all schools is free, both for study and practical training, and in these schools the adherents of the Anglican and Nonconformist churches find no difficulty in receiving a common education. Small libraries are distributed all along the coast.

These few notes may give some impression of the great understanding the medical and teaching staff have had of their task.

The Association took upon itself, says Dr Grenfell, to make Labrador's population happy. This 'the Mission' should attain more easily through the power of example, he considered, than by issuing regulations: 'We do not work to form any sect, or to teach any intellectual dogma; we endeavour to do for the workers of the sea the practical service they may need in the circumstances of Labrador; we wish to improve their social milieu and to save them from an economic system [the truck system] which is responsible for their wretchedness and poverty.' In 1922 Dr Grenfell said 'the method aimed at is to illustrate in practice the attitude Christ would assume to-day in the varying phases of the fishermen's life.' In agreement with this members of the staff have always been chosen from the laity.

Model constructive charity.

The humanitarian scheme is more widespread.

Sir Wilfred's attention had been early directed to the assistance of 'the submerged'; without his help they must have gone under. In his work

inspired by compassion he wished on the one hand to avoid the *'destructive charity'* that encourages dependence, decreases self-reliance, and pauperizes, and on the other to encourage the *'constructive charity'* that instructs, helps the unfortunate round a tight corner, puts him on his feet and inspires him with renewed courage, writes ALEXANDER FORBES (275). To avoid pauperizing those whom he assists he has required that some work or service be given in return. He aptly likened responsibility to vitamins: the paralysis that comes from a dole without responsibility to that which results from food lacking in certain vitamins. For example the stocks of clothes and other necessary articles are available for those who really need them, but they can only be obtained in return for work; in this way, therefore, they are not dependent upon the Mission. This method expresses one of the principles of the practical aims of the Association's work.

In Labrador there have been among the traders in bygone days many an octopus who used tricks to entrammel his client and then continually extort his money or goods. Dr. GRENFELL soon discovered the current system of extortion in Labrador. In his opinion the evil of such a system of supply could be overcome to some extent by cooperative associations. The first cooperative store was established in Red Bay in 1896. This was a risky enterprise. If such stores had some temporary success they were insufficiently provided with capital to carry them through periods of adversity. Dr. GRENFELL soon found that one of them had to be closed because of insolvency. However, the value of these stores in promoting the independence, self-reliance and honesty the population was found so great, that the system was continued.

In 1901 a small cooperative lumber mill was established.

In many ways the Association has shown the people how to use what they have to better advantage: fish, fur, soil. These are sufficient to enable the population of the coast to improve their living conditions, and when the necessary technique and enterprise for utilizing these resources have been developed the liveyeres will have more to fall back on. Much has been done, but much more remains to be done (275).

In 1907 Dr. GRENFELL introduced from Norway 280 domesticated reindeer with some Laplander pastors. These animals it was thought would add much to the comfort, health and wealth of the Labrador people if suitably combined with fishing and trapping, just as is done so successfully in Northern Fenno-scandia. In this matter Dr. GRENFELL unfortunately was not successful: a systematic plan for the pasturing of the herd had not been worked out in advance by competent people and the population was not instructed in the

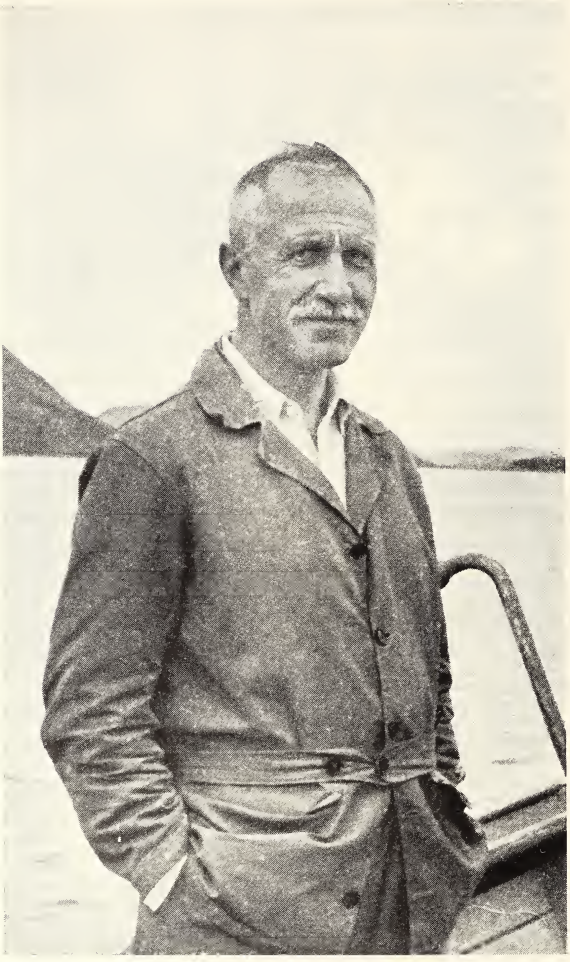


Fig. 334. The late Dr Harry L. Paddon, surgeon, Justice of the Peace, Great Gentleman of Labrador, during some thirty years a local leader of the I. G. A:s work at northern Labrador. Photo the author, July 1937.

importance of this experiment before the herd was brought to Newfoundland. The people, perhaps taking the deer for caribou, soon exterminated the herd. The present author has not a little experience in the reindeer industry, and my personal opinion is, that Dr. GRENFELL's idea was excellent in principle, and I am sure that sooner or later new experiments in this matter must be made and will have practical success (835, 364, 380, 1098).

The funds required for Dr. GRENFELL's magnificent charitable organization are great. They have been provided partly by the Newfoundland governement (in 1940 $ 5000) but chiefly by his generous friends in the United States, Canada and England. In the great American cities interested people have formed themselves into supporting and branch associations which they call Grenfell Associations, with a central bureau in New York (cf. the series »Among the Deep Sea Fishers»).

*

Some days after the above had been written Sir Wilfred Grenfell expired. The International Grenfell Association however remains for all times a brilliant memorial to what a strong and intensive personality can accomplish in the service of the good. His seed is already bearing fruit in Labrador. The self-imposed duties of the great philanthropist must now to a great extent fall upon his faithful collaborators under the leadership of Dr. Curtis. The necessary funds must largely become the responsibility of the Newfoundland Government, for it is to be feared that the outside material support will in consequence of the new world war gradually fall away when the genial master himself and his faithful and experienced co-worker, Dr. Henry L. Paddon, Fig. 334 are no longer among the active members of the Association. If the structure so carefully erected by Sir Wilfred were allowed to collapse it would be a terrible calamity for the Labradorians.

The final aim of the Association's efforts was given by Sir Wilfred in the following words: 'We are working for the time when no 'mission' need work among these men of Labrador, for they will be self-sustaining and powerful in their simple, wholesome life by the sea.' May the men who continue his work tend carefully the flame of self-sacrificing love for mankind, which he lit, see that the ideas inspiring him are not lost to sight, and make sure that the International Grenfell Association with its rapidly increasing numbers of institutions does not appear to the generous donors as a bureaucratic body and an end in itself!

Like myself the Labrador people will remember Sir Wilfred as a cheerful soul, full of life, loving a joke and a good story, and a great sportsman. Looking back upon his grand life's work in Labrador one can say with Gosling: It has been truly apostolic: to heal the sick, to cloth the naked, to feed the hungry, to teach the ignorant, to protect the fatherless. One of the salient features of his life was his religious sense of responsibility. His life was devoted to practical Christianity, someone has said. It was one of the most simple, direct, and vital applications of the Gospel to human needs that modern times have seen, says Dr. Henry Van Dyke. This explains his fatalistic conviction that faith can remove mountains which characterised the execution of his enterprises. 'I shall get the money for a new hospital', he would say, 'but I don't know how'; and he got it.

* * *

The generally high moral status of the Labradorians in our days is in all essentials the result of the self-sacrificing work carried on by the unselfish and frugal-minded personalities of the Moravian Mission and the International

Grenfell Association. But it must not be forgotten that ever since Bishop Feild consecrated the first church of southern Labrador at Francis Harbour, July 8, 1853, a number of devoted young clergymen and scholars of different confessions have tended and nurtured the good seed. We find among them representatives of the Church of England (768), Methodists (1062, 1063) and the Roman Catholic Church (130, 191, 198, 226, 250, 251, 454, 496, 498, 569, 793, 809, 904, 944, 1067, 1068, 1080, 1127). There are few amongst the white people who are illiterate or so nearly illiterate as only to be able to sign their names, since schools have also been established outside the Moravian Mission and the International Grenfell Association. The percentage of illiteracy in the whole colony was in 1921 21.3 %, in 1935 18.3 % (222). In a general way elementary education is provided by the churches, aided financially by the state which almost wholly pays the salaries of the teachers (585).

Industry and Trade.

In passing some space must be devoted to the industries at present running or planned for the future in Labrador. Naturally the resources of the sea so easily available were the first of which use was made.

Fisheries.

Fishing: 'tis an honest trade; 'twas the Apostle's own calling, said James I once (325). In our days the attitude is somewhat more complex (cf. 13, 58, 102, 148, 913; 221, 341—343, 346, 392a, 368, 453, 862, 1033).

Cod-fishery

has been since olden times the staple of Labrador and its abundance unequalled in any portion of the globe. The codfish of Labrador have been known since the days of the first explorers by sea. This harvest of the deep has also been quantitatively the greatest source of income on the coast. Even in our days the salted and dried fish from that country is in favour, though of comparatively low quality and produced at high cost in a very unprofitable way (p. 760). This latter product is popular only in West India, the Mediterranean countries and Portugal. However, to-day a crisis has arisen (cf. p. 762) (1033), and if the cod-fishing cannot become more profitable by using new methods to preserve the fish, it is probable that the rather primitive Labrador

fishery will no longer be able to compete with the modern fisheries of Scotland, Norway and Iceland. Nowadays it is quite clear, LODGE says, that the cod-fishery has ceased to be the economic mainstay of the colony and especially of the Labrador. Many people believe that not even the erection of artificial drying and curing stations in the area of production would help very much. I do not know whether any estimates have been made with regard to an industry for transforming the inexhaustible schools of cod into fish meal. I think LODGE has convincingly shown that an expansion of the Labrador cod-fishery is not compatible with sound economy if present methods are continued, seeing that the competition on the world market both in price and quality is so very keen.

Salmon-fishery.

The salmon-fishing on the east coast of Labrador is confined to that portion lying between the Straits of Belle Isle and Hopedale. Further north salmon appear to be exceptional if not altogether absent until one comes to Ungava Bay (761).

The salmon-fishery has been systematically developed by the Hudson's Bay Company. There is no better salmon in the world than that of Labrador. The catch of the individual fishermen is collected by the company's boats, frozen on a special vessel, Blue Peter, and is now being sent to the British market in cold storage and can be recognized by the distinctive trade mark: 'Hubay' (288). It might be imagined that salmon and trout canneries would be a suitable local industry. However, it seems doubtful whether the fish could be caught in sufficient profusion. It is also a question whether floating, freezing and preserving plant would be suitable for the northern Labrador coast. The production of the salmon-fishery can scarcely be increased, it is considered (cf. p. 722).

Herring-fishery.

The herring-fishery south of Domino Run might be thought to have vast possibilities. But I have no exact information concerning the experience there of an American company in recent years.

Whaling.

Whaling was carried on in olden times on a very extensive scale from the Straits of Belle Isle up to Hudson Strait (325, 889, 625). This was done by Basques, Dutch and people from New England, later also by English and to-day

by Norwegians. Huge piles of whale bones have been found on some islands, which is rather surprising, because they were once an important article of trade. At the end of last century the whale-fishery became very unsuccessful and for several years past the plants at Schooner's Cove and at Gready have been closed. After the first World War two factories were started at Cape Charles and Hawke's Harbour (364) but in 1921 both were temporarily closed owing to the low prices of the oil.

At present only one factory is running on the coast: Hawke's Bay, Figs 335 and 336. It is supplied by fast small steamers furnished with the most modern equipment, with harpoon guns handled by Norwegians trained to the



Fig. 335. Hawkes Harbour with the whaling station in the background. Photo the author, Aug. 1939.

work. Regarding the whale oil manufacture the reader is referred to GRENFELL's description (364).

It is evident that the whales have progressively decreased in number, and from a value of $ 73.440 in 1904 the return has continuously diminished, and will probably soon lose its place as a potent factor in the economy of the coast.

Sealing.

Sealing has since time immemorial been an important industry on Newfoundland where many hundred thousands of them are slaughtered every spring (45 a). Also on the Gulf Coast masses of seals are killed, panned and sculped (skinned) every spring. Already in 1774 CURTIS (196) strongly recommended that the seal fishery should be more widely followed on the coast. However, it has not developed much. For instance, about 1860 at the four Moravian Mission stations the average annual catch was only from 3000 to 4000 seals

(787 a). The ice-belt off the coast, which often breaks up, and the large pans of moving drift-ice which the many herds of seal follow toward the south in November, are unfavorable for the industrialization of seal-hunting. Another discouraging factor is the low price of seal oil. This is due of course to the industrialization of the hunt of the big sea animals. Lately I have seen a notice that the Hudson's Bay Company will actively take part in the sealing



Fig. 336. Whale oil plant at Hawkes Harbour. Copyright Wilmont T. De Bell, Aug. 1937.

industry. Whether this will have some reaction on the sealing in Labrador I am not able to say.

Fur-farming.

One industry which has been much developed elsewhere under the same natural conditions as prevail in Labrador is f u r - f a r m i n g. This industry was once tried out in modern ways, for instance at Voicey's Bay. The result however was not very encouraging and the attempt was given up. There is a chronic lack of land animal's meat in Labrador, and experience has shown that if the foxes are given more than 15 % of fish in their food they do not thrive and the skins are not first class. This industry has therefore not gone

beyond a trial and, according to what one of North America's foremost experts in this sphere told me in conversation, has no future in Labrador (71).

Forestry.

The largest and perhaps most valuable of the natural resources of Labrador which can be continuously utilized lies in the spruce woods (cf. p. 408 sqqq.). With reasonable investment it can be gradually exploited with the labour power of the country itself and developed into a large, permanent industry with sawmills and cellulose plants. Timber for lumbering is available



Fig. 337. The »Labrador Development Company» at Hope Simpson greeting the expedition with the flag of Finland (536 a).

in large quantities near the shores of many bays and rivers (p. 410 sq.), which offer swift conveyance of the logs and the lumber from the interior to mills on the seashore.

Yet to-day the lumbering industry is surprisingly little developed. Only one undertaking on any important scale, 'The Labrador Development Co', has since 1935 secured a medium term loan from the government and embarked on the cutting of pit props for the Welsh market. But nobody has as yet exhibited any anxiety to follow the example set by this firm (585). The forest industry's vanguard is this Development Company's plant at Hope Simpson in Alexis Bay, Fig. 337. Another small private establishment is to be found in Kipekak Bay. Here there is planning for export, which if it succeeds, may be of great importance for the future of the country. Many sawmills, however, were

started earlier but closed after a few years, and it is not difficult to conceive the cause: a high custom tariff has resulted in an abnormal high cost of living, and this reduces the competitive power. A firm which began work about 1910, of which the buildings still stand in the Mud Lake district, was compelled to give up; likewise another at Epinette Point. But hitherto efforts in this direction have been of the very simplest type: the export of boards and some pit props for English collieries. Demand is still great. At the present time concentrations of population, such as those at Hope Simpson and at North West River, may become a factor in the rationalization of this branch of industry. In the future there is little need to fear that, as happened a few years ago, the work must be abandoned because the imported workers, dissatisfied with conditions and pestered by the flying insects, simply departed to countries with happier conditions. There are at present only a few — about ten — small sawmills for the domestic needs of the coast. Much less than the annual growth of timber is taken. The primeval forests therefore degenerate and decay because no attempt is made to look after them (p. 407 sq.). For all this, sooner or later, a forest industry will come into existence. The basis for the utilization of the forests must then be a systematic development of the necessary transport ways and floatable water- ways on the one hand and on the other the employment of local workers. Both these depend on a reasonable land settlement (p. 823 sq.). No great capital investment is necessary for a gradual development of the industry, the capital expenditure should be on the direct employment of local labour (585).

Minerals.

Indications of the deposits of minerals containing copper and iron in Newfoundland-Labrador have been previously mentioned (p. 111). At the present state of our knowledge, however, they have no economic value.

Iron ore fields.

On the other hand, in 1895 Low (588) brought back the first authentic report of treasures in Labrador's hinterland, especially of the enormous iron ore deposits. To-day it may be judged that these latter in the heart of the peninsula, on the Lake Plateau, on both sides of the boundary between Newfoundland's and Canada's parts of Labrador, will be of great importance. There are large deposits of magnetite with a content of mangan and layers of hematite and some siderite both separate and mixed. When Low found them during his exploration work in 1892—1895 the Indian canoe in summer and

the snowshoes in winter were the only means of communication in that part of the country, and not until the airplane became a practical method of travelling was it possible to carry out thorough geological prospecting for ore. Since 1936 this has been carried on by the *Labrador Mining and Exploring Company,* and its fieldwork is entrusted to the Canadian geologist Dr. J. A. Retty; cf. Figs 338 and 339. The investigations have been most successful, and the leader told me he was preparing a comprehensive survey of the results. Unfortunately owing to difficulties due to the new World War I have been unable to get access to this report so I can only give some indications of what it may



Fig. 338. Meeting at Ashuanipi Lake with Dr. J. A. R e t t y, the leader of the »Labrador Mining and Exploring Company's'» geological expedition to Labrador in 1937 and the prospector T o p i S e p p ä n e n from Finland. Photo the author, Aug. 1937.

contain deduced from what I heard during my visit to the prospectors and read in an authorized newspaper article 1938 (261; cf. also 919).

At that time three iron ore fields of high quality had been located, viz:

1. Sawyer Lake Field, bearing hard hematite ore, lies about 284 miles (c. 457 km) northwards from Seven Islands on the north shore of the Gulf of St. Lawrence and about 245 miles west-north-west from North West River at the west end of Lake Melville.

2. Attikamagen Field lies about 35 miles north-west of the former, and

3. Ruth Lake Field north-west of the two previous ones near the Canadian border.

The iron content varies somewhat, but the general tests give the following round figures:

Sawyer Lake	60—70 %
Attikamagen	40—45 %
Ruth Lake	57—64 %

The phosphor and sulphur content is reported to be specially low, and that agrees with what I myself saw in the samples.

At Sawyer Lake the deposits are considered exceptionally rich and fine, and are said to surpass, from a metallurgical point of view, the world's best



Fig. 339. Visit to the prospectors' encampment in the heart of Labrador, north-west from Petitsikapau Lake. Photo the author, Aug. 1937.

hematite ore. The Attikamagen Field is poorer as regards iron content, whereas the tonnage is said to be extremely large; the actual tonnage was estimated in 1938 at more than one billion tons. According to the results obtained by 1938 the supply of ore worth mining in these three fields alone may be estimated at several thousand million tons. The extensive prospecting and development work will give a far more definite basis for estimates of the potential reserves than was available before the beginning of the World War.

If we now sum up we may conclude that the supplies of iron ore give certain promise of securing there a great production of pig iron and steel for a very long time ahead. One may even dare to say that for many future years the continent can be self-sufficient in regard to iron from the Labrador fields.

No other iron deposits have since been discovered in the northern part of North America so plentiful and so rich as those in Labrador (288). It is thus to be expected that just based upon this supply of ore a great local iron production will arise, probably one of the largest in the world.

Sources of power.

To these enormous resources of ore is added another extraordinary favourable circumstance for the setting up of an industry here: the possibility of cheap production of power on the spot. Only 85 miles south-east of the Sawyer Lake field there is an inexhaustible source of energy in one of the world's greatest waterfalls: the Grand Falls in Hamilton River; Figs 74 and 75. It was discovered a hundred years ago, but because of its inaccessibility has been visited by only a few whites, and its enormous power has never yet been utilized. Since the end of the ice-age the roar of the Grand Falls, the lonely rival of Niagara, the second greatest cataract of North America, has thundered across the woodland, VARICK FRISSELL writes. It is more than twice as high as Niagara, and, if harnessed, it could not only turn the wheels of industry in all eastern Canada, but would electrify the other sleeping goods of Labrador's wealth (288). No wonder that it has stirred the imagination of many industrial minds. Many explorers, commercial and industrial leaders, believe the Grand Falls region to be the key to Labrador's development.

In the uppermost part of the Grand Falls the masses of water from the Lake Plateau drop almost vertically 101 (588) [114] m, resp. 312 ft (288) down the north side of a canyon, at the bottom of which it continues twelve miles as a steep rapid between precipitous cliffs 100—150 m high. The total fall between the lowest lake of the Lake Plateau and the mouth of the canyon valley where the connected rapids come to an end is said to be 245 m. The whole of this stretch of falls and rapids which together form the so-called Grand Falls can be exploited without technical difficulties.

The Hamilton River leads a very considerable mass of water into Grand Falls; I was told that it amounted to 50,000 cub. ft. per sec. or 1414 sec. cub. m at average low water (!). When VARICK FRISSELL in July 1925 visited the falls, the discharge was about 80,000 cub. ft. per sec. (288). Calculated in hydraulic energy the former quantity of water should give a total of

a. 1,600,000, HP. from the chief fall of 101 m.
b. 3,850,000 HP. from the total fall of 245 m.

In considering the size of these figures I have checked them somewhat. The precipitation area of the Lake Plateau is about 92,400 km²; these figures of course stand or fall by the reliability of the map material. The annual precipitation on Labrador's Lake Plateau is some 550 mm. There appear to be no systematic measurements of the discharge of this area. Yet, if one dares to proceed from the assumption that in two large districts which correspond completely morphologically and which have the same vegetation habitus ought to indicate an agreement in moisture conditions, and I think one is justified in so doing, the conclusion may be drawn that hydrologically the Lake Plateau can best be compared with the central northern part of Lapland with an average discharge coefficient of 0.65 or perhaps at the most 0.75. The lower figure gives an average discharge of about 1000 (1040) cub. m per sec. which would give respectively

a_1. — 1,150,000 HP
b_1. — 2,750,000 HP

The difference between the total amount of possible energy calculated thus and that above for the average amount of low water is very great. Yet both agree fairly well in regard to order of size.

One favourable circumstance for the utilization of the water power is that the Lake Plateau of Labrador is a completely wild country, so that this store of water can be regulated exactly as is found best. VARICK FRISSELL thinks that by damming the lakes and a certain 'pirate' river farther upstream, the flow could probably be brought to well over 100,000 cub. ft. per sec. This means that from 3,000,000 HP upward is available (288). When, for comparison, we realize that the total harnessed water power of Sweden is only something more than 2.5 millions HP and in Finland some 0.75 million HP, a slight conception may be had of the unrivalled scale of Grand Falls and the enormous amount of energy going to waste here. The exploitation of this source of power will further be fairly cheap and easy because nature herself has done the chief work by wearing out the deep canyon in which the water runs and which is easily dammed up; cf. Figs 74 and 76.

The solution of the problem of transportation is a vital one for the harnessing of Grand Falls. After the conclusion of the prospecting in the three ore fields mentioned it is assumed that the first task will be to connect Sawyer Lake Field by a railway about 300 miles (480 km) long with Seven Islands on the Gulf of St. Lawrence; this is necessary also for the transporting of building material and mining machinery. A side track for the same purpose, 70—85 miles long, will be built from this railway to Grand Falls.

But there are also other projects. FRISSELL reports that the Provincial Government of Quebec has already granted a charter for a railway via Grand

Falls and connecting Quebec City with Hamilton Inlet. An ocean port for Canada is an old idea. The Labrador transpeninsular railroad would form the shortest route between Europe and America; the route from Hamilton Inlet is 750 miles shorter than that from New York and 450 miles shorter than that from Montreal. Paper, pulp and iron would be the visible and most important freight on the railway (cf. 288). The experience of railway building through primeval country of similar geological formation as that, e.g. of Canada's ore-bearing country is an encouraging precedent.

The actual value of Grand Falls depends, of course, on whether or not there is a ready market for the energy it could develop. Fortunately in the same region there is besides the iron ore also spruce in inexhaustible quantities which only await transformation into pulp and paper etc. The outlook for the manufacture of steel having been revolutionized by the development of electric smelting, the Labrador iron deposits have become infinitely more valuable through the tremendous energy of Grand Falls. Though iron will give the Grand Falls its initial load there is no doubt that the weight of pulp and paper mills will be felt soon after (288). The situation of the country would favour the establishment of industries, e.g. nitrogenous fertilizers, carbide etc., which involve high energy consumption.

The industrial enterprises in central Labrador would be protected against enemy attacks, considered from England's point of view, as well by two thousand miles of ocean and by the Monroe doctrine (585).

For the present it is not possible to reckon upon any other metallurgical or mining industry in Newfoundland-Labrador than that upon the Lake Plateau.

On the other hand sources of hydraulic energy are available in many places and these could be regulated in any suitable way, because in most of the valleys there are lakes which can easily be dammed and their storing capacity thus enlarged. But for the present no demand for energy exists.

Communications.

Much has been done to improve the means of communication in Labrador for the purpose of giving support to the occupations of the fishermen from Newfoundland.

Nearly four decades ago a telegraph line was laid along the north shore of the Gulf of St. Lawrence to Forteau Bay, and during the first World

War this was continued to Henley's Harbour. In 1939 there were wireless Marconi stations at seven places, and these are in connection with commercial and amateur stations in the interior and in the north. At present it is generally possible to get an answer to telegraphic questions within 24 hours from the most distant European places.

The m a i l is mostly under the care of the Hudson's Bay Company's and the Moravian Mission's stations. In the summer the post comes every second or third week. Every little boat can however be said to be a mail-boat, and they take the post from the stations to e.g. the fishing schooners, etc. in a short time. When the steamer traffic ceases in late autumn the post is sent from the Gulf coast two or three times in the winter to stations on the Atlantic coast. Occasional aeroplanes also take the post with them; I myself once took with me to North West River a Montreal newspaper only 20 hours old.

S t e a m e r s. In 1877 the Moravian Missionaries were given a steam launch to ply between their stations. In 1880 the Newfoundland Government first sent a mail steamer along the coast as far as Hopedale. At the present time passenger and freight traffic is very well arranged in summer by the mail steamer *'Kyle'*, Fig. 311, which operates the service from St. John's to Hopedale. There a schooner hired by the state takes (1939) the mail and passengers travelling further to Nain and Hebron. The *'Kyle'* can be most highly recommended; the passengers are well looked after and enjoy all conveniences. It makes some fifty ports of call from Battle Harbour to Hopedale, and the season runs from June through to October. This cruise occupies approximately two weeks and the service is the only one regularly offering access to the area north of Battle Harbour. It is, however, a disadvantage that the *'Kyle'* cannot follow a time-table, for not even Captain Connor can control the capricious ocean fogs. On the Labrador coast, north of Hamilton Inlet, experience is the only safe guide. There are few marks and no buoys in the channels; the most able captain could never navigate this by chart (614; cf. however 273). People and cargo are also conveyed by the Hudson's Bay Company's motor-schooners, e.g. *'Fort Garry'* and others.

The residents one meets here are very obliging in every way even towards strange travellers, and ordinarily there seems also to be room for an occasional visitor in their homes. On the other hand only very seldom can one reckon upon hiring a boat in the summer; this should be arranged during the early spring by correspondence in St. John's; the boats on Labrador are few and much in demand during the salmon- and cod-fishing season.

Trade.

In our days the trade north of Indian Harbour is practically speaking exclusively in the hands of the H u d s o n's B a y C o m p a n y. South of it there is a slight penetration of traders and co-operative stores during the fishing season, e.g. in Battle Harbour, Fig. 340, and this is said to have produced some competition which helps the local population to buy and sell or



Fig. 340. Battle Harbour. Looking from south-west (536 a).

barter under somewhat more favourable conditions than would otherwise be possible. Yet the Company dominates the trade.

In Labrador the Company has been a very important instrument in the cultural transition, and some account of it here is therefore justifiable.

HUDSON'S BAY COMPANY,

incorporated 2nd May, 1670, is a privileged British trading firm originally founded for the purchasing of pelts in the countries round Hudson Bay; its

motto: *Pro Pelle Cutem,* speaks for itself. It is the only private firm which still has the right to bear its own emblem: H. B. C., in the British national flag, and its officials wear a uniform cap of military style. In 1870 trade in articles of consumption was added to the fur traffic and now the company supplies these, and almost exclusively, to the population living in arctic and subarctic North America (cf. 51, 92, 66, 110, 181, 264 a, 404, 431, 462—465, 566, 608, 610, 611, 622, 668 b, 811, 1001, 1027, 1037, 1108).

In Labrador, as in other places, the Hudson's Bay Company headed by indefatigable men has been a harbinger and pioneer of civilization in the wilds. It has jokingly been said that H. B. C. means that they were 'Here Before Christ'. And it is true that it was they who first penetrated and explored the endless Canadian wilderness, after which the missionaries followed in their tracks (903).

The H. B. C. was followed by other fur trading companies (66, 194, 609, 634, 751 a, 984, 1027) but particularly since its amalgamation in 1821 with the North-West Company it has controlled the boreo-arctic part of the continent from coast to coast. To-day it still continues its commercial operations with the liveyeres and the aborigines all over this territory, thus extending the fur trade into the less accessible parts where wild life flourishes (1036, 510). In the life of Newfoundland-Labrador on the other hand the Company is a relatively recent factor.

As far as concerns Labrador the land was purchased from the successors to the rights originally obtained by CARTWRIGHT (325). MCLEAN (610) certainly pointed out about the year 1831 that the Company having learned from a pamphlet published by the Moravian Missionaries that this country produced excellent pelts was induced to make use of the knowledge. It seems however more probable that CARTWRIGHT's proposals to establish hunting and trading posts on the Labrador were carried out by the H. B. C. after his death.

Many trading-posts were gradually founded by the Company in eastern Labrador: Fort Chimo (1827), Fort George River, Erlandson Post (probably at the northern end of Indian House Lake), Fort Rigolet (1837), North West River Post, Fort Naskaupee (on Petitsikapau Lake, 1840—1873; cf. 610), Fort Winnikapau (on Hamilton River, 1866—1873; cf. 588), Fort Mishikamau, Saglek Bay Post and Nachvak Bay Post (after 1866 or somewhat later; abandoned some time ago; cf. 275), Fort Aillik (about 1866; cf. 147), Cartwright, Davis Inlet, Voicey's Bay, Frenchman's Island and Port Burwell, the bleakest of all the Hudson's Bay Com-

pany's posts in Labrador (Figs 79, 80 and 342). Lately the Company expanded northward. By the agreement of 1925 with the Moravian Mission the trading rights and stores, wharfs and office spaces at the stations M a k k o v i k, H o p e d a l e, N a i n and H e b r o n were transferred to the Company for a period of 21 years expiring 1947.

When one comes to a village the Company's neat, white buildings with their red roofs stand out at once from among the other houses and huts; cf. Figs 341, 169 and 204. The buildings, workshops, vessels etc. which are



Fig. 341. Hudson's Bay Company's store and its manager's bungalow at Cartwright. Note the boxes with salmon to the right. Photo the author, June 1937.

so well managed and looked after have served as models for the population. In the stores, too, perfect order reigns and only first class commodities were stocked wherever I went. Also the friendliness and care which the Company's local managers, clerks and other assistants showed to their clients really greatly impressed a stranger from the Old World. It is clear that in all cases the staff is most carefully selected. Many of the men who have first contributed to the building up of the Dominion of Canada started in the service of the Hudson's Bay Company; Lord Strathcona, the founder of the Canadian Pacific Railway began his apprenticeship in Rigolet and managed the North West River station for several years.

In the shops it is possible to obtain all the goods necessary for a household in Labrador. They are necessarily high in price, they must pay a customs



Fig. 342. Harbour of the Hudson's Bay Company's trading-post of Port Burwell, north-easternmost Labrador. Photo ALEXANDER FORBES, Aug. 7th 1935.

duty for everything imported (up to 64 % *ad valorem*) and furthermore the risks of storage and unavoidable credit are great under the prevailing circumstances. But an inestimable advantage is that everything sold is of good quality. On the other hand the Company buys the products of the trappers and fishers and pays high prices, especially for the pelts. The internal price level and the cost of living are therefore rather high in Newfoundland-Labrador for a foreigner.

In Labrador you will hear much adverse criticism of the Company's trading. Yet everywhere in the world where fishing is practised on a great scale there are evil critics of merchants and supply. Meanwhile in most cases the views of the fishermen are wrong. I remember from my many cruisings in northernmost Norway at the beginning of this century — and there is not much difference between Norway and Labrador in this respect — how the fishermen bitterly pictured the rapacity of the merchant who bought their catch endeavouring to get the unhappy fisherman into his toils. People would not realize that such an uncertain business as cod- or salmon-fishery, which presupposes a large amount of credit from the merchant to the fishermen during the bad seasons, makes it necessary for him to have a reasonable profit in advance during the periods when high prices prevail in the fish market to secure the continuance of his enterprise when prices fall. On the other hand my own impression was that the average fisherman was often on the look-out for the merchant who would give him most of his outfit and food on credit; if they had saved cash few of them would use it to purchase supplies; the merchant had to run all the risks. This matter has undoubtedly been very similar in Labrador in bygone days; (cf. Governor King's remarks in 1792 in325; Hind; Grenfell). Irregularities may have occurred in the business, but they must be exceptions. In many cases the Company's task has been confused with that of the philanthrophic associations operating with voluntary contributions. The task of the Hudson's Bay Company's stations is to act coolly and carefully like a sober and practical merchant should do if he looks after his firm's advantage well and secures continuity for it. It is only natural that the Company has no reason to pursue philanthropic aims and to encourage the penetration of the wilder parts of the country; the fur traders ought, of course, to endeavour to reserve the country for the trappers and protect the hunting of fur animals against intruders. And it seems that the Hudson's Bay Company, having been entrusted with the regulation of Labrador's economic life, has done it well as far as I understand it. But there seem, of course, to be some circumstances in connection with the trade which might, with certain modifications, be made more advantageous for the people without any loss to the Company.

All things considered from what I have seen and heard and read of the Hudson's Bay Company (153, 610, 264 a, 810) it is clear to me that as an element for the furtherance of order and education among the Labrador population H. B. C. has had and still has an importance which cannot be overestimated. Its managers and staff have pacified the wild people, and organized and introduced system into the economic life of the whole population. Their only means of compulsion has been trade.

Future of Newfoundland-Labrador.

Labrador is often called the land of promise. This is however a truth which needs modification. Nobody should believe that the permanent population of abode in Labrador can transform its natural resources into clinking coins without great pain and fatigue. It is well known that the great fisheries are run at a loss. The whaling gives a very small margin of profit. The seal-hunting has almost been given up. The capture of fur-bearing animals and salmon-fishing combined with seal-hunting and cod-fishing for household needs are the only regular sources of income worth mentioning at present. The people live in the main from hand to mouth on these predatory means of earning a livelihood. The country has developed its fishing and fur industries to the complete neglect of its agriculture, someone has said; as soon as things go wrong with the present natural industries the people are in a bad way and require food from abroad. It is naturally dangerous to neglect any opportunity for food production. — (Cf. also 352, 370, 421, 585, 720, 918 a).

'The viewpoint has been expressed that the men of Labrador should be left to sink or swim, but', says Dr PADDON, 'it is deplorable if any potentially prosperous section of the community is left to go under for lack of readjustments which are not hard to discover or to effect'. A stranger soon gets the impression that the people, for want of an economic plan, are driving heedlessly toward an uncertain future. Even if the enormous supplies of ore on the Lake Plateau are exploited it will scarcely make the circumstances of the coastal population easier (cf. p. 804 sqq.). The same can be said of the exploitation of the water power and the forest supplies under present conditions.

The future development possibilities of Newfoundland-Labrador can be judged from two points of view.

It may remain an exploitation colony where the utilization of the great natural resources, especially the forests, the ores and the hydraulic power sources, as well as the arrangement of the tasks necessarily connected with them, will be conceded to private, capitalistic enterprises, while the state

restricts its activity chiefly to the maintenance of order, jurisdiction, some means of communication and the collection of taxes.

It is however also thinkable that the state without suffering any harm may give up its passive financial policy in Labrador and in the future take part directly in the organizing of an intensive exploitation of the permanent natural resources. These latter have precisely the same possibilities there as for instance in Fennoscandia where this has been done to the advantage of both the local people and the state (cf. my study: L'utilisation économique du territoire de Petsamo. Moyens et buts. Fennia, Vol. 49, No. 3, 1926). There are both advantages and disadvantages to be considered.

Before entering into the details of this question one circumstance must be recalled which is often forgotten and which it is necessary to know for the understanding of the backward condition of Labrador.

The boundary between the possessions of Canada and Newfoundland in Labrador remained for a long time uncertain, and therefore the judicial conditions were vague. No one could say precisely how far the sphere of Canada's jurisdiction extended to the east and where Newfoundland's laws began to be valid in the west. This of course gave rise to a state of insecurity which prevented capital and initiative entering this 'No Man's Land' where no one could use pick or shovel and feel sure that he would have a title to his claim on the morrow, FRISSELL wrote (288). The enormous ore deposits lay unused, millions and millions of horse-power ran to waste in the numerous waterfalls, the forests died away from the roots and there was no cultivation of the soil worth mentioning. The state's passive financial policy was clearly no blessing but is comprehensible when one remembers the uncertain conditions.

Finally in 1926 the decision of the Privy Council definitely fixed the frontier between the rival Dominions and put an end to the insecurity (303, 325, 334, 407, 408, 438, 455 b, 502, 602, 605, 765, 766, 937, 863, 1025, 1026, 1109, 1126). The area governed by Newfoundland's Timber and Mining Laws, etc. is now quite clear (cf. TAIT's *Synopsis* in 913).

After the settlement of the old frontier disputes greater interest in Labrador began to assert itself because of its vast natural resources. The enormous deposits of ore on the Lake Plateau were subjected to a modern investigation by 'The Labrador Mining and Exploring Company'. An evaluation of the raw material for a pulp and paper industry in the forests of the water system of Lake Melville was drawn up by means of aerophotographs, presumably on the initiative of Bowater-Lloyd. Concessions of enormous forest areas were held by various interests; in 1939 no less than ten firms. These continued to

pay small taxes to the government in the hope that some day the world demand for wood would reach such a point as would make their holdings remunerative (585).

This policy of granting concessions has meanwhile up till now been quite unable to show any success worth mentioning in Newfoundland-Labrador's industrial life.

I do not believe that the Labrador population has any reason to bewail this fact. It would rather have been a misfortune for them if large scale industrial activity had been started there before planned colonization of the area had begun. Big industry would certainly have hindered a sound development of colonization before it was well started; with its auxiliary industries claiming the labourers the latter would have been attracted from important seasonal work while the colonization was in progress.

According to the second alternative stated above, which might be called the Fennoscandian working principle, the future of Labrador could be gradually built up in the first place upon these sources of livelihood which guarantee a continued run: the soil, with hunting, trapping, and fishing. When the colonization established upon these resources has been consolidated and indigenous workers are available who are accustomed from childhood to control the severity of nature, the time will have come for a progressive introduction of a rational forestry. On this other industrial activities could be founded. Confirmation of this opinion is: In the boreo-arctic regions the permanent income from well-managed forests and grass-land and the auxiliary occupations possible there are better than gold mines.

Possibilities for Mixed Farming.

Is there then any justifiable hope for rationalized agriculture in Labrador (cf. 376, 585, 840, 842, 844, 845)? Let us go into the matter a little more in detail.

Junek (510) has divided the north shore of the Gulf of St. Lawrence into three ecologic zones. In the first zone from Tadoussac to Betsiamites the dominant industry is agriculture (cereals, hay, various vegetables, tobacco for home consumption). In the second zone from Betsiamites to Seven Islands lumbering with pulp-production predominates. The third zone involves our territory from Seven Islands to the eastern limit of the Labrador coast. But in this zone he distinguishes two physiographic sub-zones divided at Natashquan: the western has a more luxuriant vegetation consisting of occasional heath plants, stunted pines and the like, the eastern sub-zone is bleakly devoid of any leafy or woody growth other than undersized conifers which appear only in depressions and

freshwater accumulations. In the third zone only fishing and hunting are found, the former predominates in the spring and summer, the latter is pursued in autumn and the long rigorous winter. Farming is impossible mainly owing to short vernal seasons and mid-summer frost. Two months of growing is not enough to repay the labour and expense.

With JUNEK's conclusion regarding the easternmost sub-zone the author cannot agree. The productiveness of Newfoundland-Labrador is not to be disregarded. The district is not precisely a Garden of Eden, but the experience gained for instance from g a r d e n i n g is impressive.

As regards the coastal tracts near the 57° parallel HUTTON wrote (476, 478):

For many years the missionaries have made gardens. There is not much soil, probably the old missionaries had to carry soil in barrows and build it into gardens before they could get their vegetables to take root and thrive. Six or seven feet down the ground is permanently frozen. But the blanket of snow preserves in winter some of the roots and so the rhubarb comes up year after year.

At Killinek even the keen missionary gardener could get little or nothing for his labour. The garden was a tiny railed-in patch of earth, scraped together from among the stones; a few pallid leaves and shoots showed where the lettuce and the turnips were trying to grow, having a sad struggle against the bleak air and the chilling fogs and rains.

At Okkak one gets the snow cleared away in May and then leaves the ground to thaw in the sunshine. But the actual planting out does not take place until July, and in the meantime the vegetables are growing in the house or under frames. It was here that the missionaries were compelled to give up their greenhouse after futile efforts to grow early vegetables. Not until the nights begin to get a trifle milder can one dare to put the cress and lettuce, cabbage and potatoes in the open air. The potatoes, turnips and cabbages would not be of eatable size until well on in September. In August one gets some lettuce carefully grown in window boxes or under glass in frames, covered with sacking against the night frost. No night is safe from frost in northern Labrador; snow may fall in August. Evening by evening the missionary looks at the thermometer, and if night frost is likely, covers each tiny struggling plant.

The dogs, the mice and the frost are always hostile to the gardens. By the help of wooden palings one manages to keep the dogs out. In years when mice are plentiful one covers each shoot with an empty meat-tin overnight. The frost one fights every night by covering each row with a wooden framework over which sacks are spread. In this way the hardier sorts of vegetables grow to a moderate and eatable size even in Okkak before the ground freezes again in October.

PRICHARD (671) in 1910 found the garden beds in Nain bright with hardy flowers, mostly pansies and poppies, and from the greenhouse, where roses were blooming, they cut lettuce. Later in the season lettuce matures in the open, while rhubarb grows not only sturdily but luxuriantly.

All these northern mission stations are near the ocean and this strip of the country suffers from some real physical disadvantages, the distance from the Gulf Stream makes the winter severe, and the nearness of the cooling Labrador Current and the attendant clouds and fogs, which shut out the life-giving sunshine, make the summer on the coast rather cold.

Conditions further south are better, especially after leaving the outer coastal strip the climate becomes much better than its reputation. Growth may begin relatively late, but when it does begin it soon makes up for lost time. The head of the Hamilton Inlet may be termed the garden of the Atlantic coast of Labrador, already HIND wrote (434). In the middle of July I found the gardens with vegetables (lettuce, carrots, beetroots, turnips and cabbage) growing in profusion in North West River. There is the great insolation of the relatively southerly latitude and moisture in the soil at just the moment when they are most required. — It is just this which makes the forest reproduction so striking inland (585). — Is it not surprising that agriculture at the head of Hamilton Inlet is commonly three weeks ahead of agriculture in St. John's (731)!

At Salt Pond, close by Sebashkau (Lake Melville) the Michelin family is flourishing to the tune of ten barrels of potatoes, and enough cabbage, turnips and other common vegetables for winter eating (Labrador souv. suppl. to the 'Daily News', St. John's, October 19, 1938, p. 15).

Following a 'Memoir concerning Labrador, 1715—1716', by an unknown writer, de Courtemanche had at Bradore a large garden where all sorts of vegetables grew: peas, beans, roots, herbs, and salads. He had sown barley and oats which grew well. He kept horses, cows, sheep and pigs (325).

We can therefore state that in the southern interior of Newfoundland-Labrador, where the soil is suitable, the climate not only allows potatoes, turnips and cabbages and other common culinary vegetables to grow, but also to give a yield which cannot be much less than the average in the English Midlands (585).

The growing of potatoes and other vegetables is of course important for the people; they give a quick return from the land and the necessary variation of food and vitamins.

But as a basis for a rational colonization of Labrador farming on a large scale is demanded. It has been stated that the natural conditions, specially as regards vegetation, are much like those in northern Fennoscandia. Now, well-managed farms with mixed farming and gardens in Finland's Lapland clearly show that agriculture can be successful in such an

environment. As far as I can judge it will in appropriate forms give also the Labrador people in some sections a chance to grow an important part of their food and to earn a little money by helping to supply the demands of other sections.

Good guidance in this matter is to be had from the experience gained years ago in northern Fennoscandia of which the soil, climate and vegetation are similar to those of Labrador; both are rather continental in type. Consequently the manner in which the land is utilized in the former may be some help for the latter. On the other hand I heard it argued in Labrador that a considerable amount of agreement in this respect was to be found between the Atlantic coasts of Labrador and Norway, and thus the best ways of living should be almost the same in both countries. This is wrong. I think the routine in the coastal districts of Norway cannot hold good for Newfoundland-Labrador. Norway has an extremely maritime coastal climate and the vegetation period develops of course in a different way there from that in the continental Labrador. Under these circumstances agriculture in northern Fennoscandia is not only suitable as an object of reference in considering the colonization of Labrador, but it is the only relevant one because the external conditions are very similar (p. 401). It seems therefore appropriate to follow as far as possible the Fennoscandian principle. The model is to be found among e.g. the rural population in northernmost Finland until agriculture has as far as possible been stabilized and has worked out its own routine in Labrador.

There is no land asking for c r o p s in Labrador. Yet, barley (seed of the hardy Lapland type) would undoubtedly grow rather well in the continental climate of the Hamilton River valley, but scarcely oats. In 1843 experiments were made by the Moravian missionaries with seeds of barley and other cereals, as well as of trees from the Himalayas. The barley came up but was cut down by frost before it had attained much growth, while the tree seeds did not even germinate. This shows, as was to be expected, that grain will not grow in the outer coastal strip. However barley will probably develop satisfactorily in the interior. Yet I think it would not be very profitable to plant cereals; flour would certainly be more cheaply imported from the American agricultural districts with their warmer climate and better soil.

The chief desiderata for Labrador is l i v e-s t o c k, and they should be fed on the produce of the land.

Cows were formerly kept in Labrador for their milk and meat, but were given up later on.

In 1857 it is reported that Mr Donald Smith, later LORD STRATHCONA, when residing in North West River had four head of cattle, besides sheep, goats, and fowls; there was milk in plenty, and the Moravian missionary ELSNER from Hopedale, who reported this, for the first time on Labrador tasted fresh roast beef, mutton and pork (325). At the Hudson's Bay Company's post Rigolet there were about seven acres 'under crop', and the farm boasts of twelve cows, a bull, some sheep, pigs and hens, HIND wrote in the 1860's (434). However, it seems that HIND has confused Rigolet with North West River.

— HIND writes: It will not excite surprise that until 1860 the only cow on the Gulf coast east of Eskimo Point was at Nataganiou; the happy proprietor obtained but little profit from his charge, for the impression gained ground among the simple people that cow's milk was a cure for all imaginable maladies. From far and near they sent for a 'drop of milk' when sickness was upon them, and the owner had no milk for himself. —

For what reason cattle-rearing has not developed since, the author does not know. If I was correctly informed, in Newfoundland-Labrador north from Red Bay were in 1937 only the low total of 12 cattle, 2 calves and (in summer) 2 horses. According to this information most of the cattle belonged to the International Grenfell Association, and their feeding stuffs (hay, grain) were imported by steamer from Canada. The cattle in North West River eighty years ago certainly did not live on imported food, just as little as do the two cows which the trappers in Kenamish were said to have procured some years ago. Cf. Fig. 188.

For live-stock purposes p a s t u r e is a fundamental demand; its area will determine the number of them. Pasture can be laid down in the first place on the clayey ground at the shores of the lakes and rivers if the thickets of willow and alder now occupying them are removed. In this way large areas, e.g. around the Hamilton River's mouth, round Goose Bay, Mud Lake Tikkorlak, etc. could be transformed into pasture. If there is only a slight indication of grass in the scanty damp woods, especially on the river sediments, the cattle themselves will transform them in a short time into grass-land, and it is only necessary to cut down the trees and perhaps scatter some seed on the soil to transform it into permanent pasture land. The manuring resulting from the grazing will create permanent pasture which can be changed into arable land. Already in 1860 HIND stated that near Mingan wild peas and vetches and hay are found in abundance on the coast a little distance from the shore and in the rear of the first belt of timber, affording natural pasturage for the cattle. Although the soil is poor, there is yet so much available manure in the form of fish offal that farming on a small scale might be very easily

associated with fishing operations, and a settled population gradually establish themselves on the coast (434).

Grass-land and live-stock seem therefore to be the main essentials if one takes a long view. Cattle, goats and sheep can be kept all over the southern half of the country. It would be most advantageous to use the cattle for d a i r y i n g. Then in the summer they may also be turned loose, they will manage to feed themselves and in the fall they can be rounded up and either kept over the winter or eaten. — The hardy and unpretentious, very productive race of 'North-Finnish cattle' would perhaps be the most appropriate and easily managed under the conditions prevailing in Newfoundland-Labrador.

The summer in Labrador is relatively short (p. 299). The period during which the cattle can graze out in the open can scarcely be longer than from the 25th June to 30th September. For the rest of the year they must be stall-fed and well fed, if they are expected to produce plenty of milk. Thus there is need for a considerable amount of stall-feed, especially hay.

The necessary w i n t e r f o o d is to be had partly on the natural grass-land and fen-land rich in *Carices*, and partly by raising hay and green-fodder on cleared ground.

The districts near the outer coast are forbidding, barren in the extreme. Even on the outskirts of the forested areas the acreage of productive land is mostly very restricted. Such regions of course must be avoided by modern society, and people who do live there have special reasons: seasonal abundance of cod, salmon and seal (510). Experience has shown that permanent dwellings are not possible there; in the winter the coastal districts north of Red Bay are also practically destitute of people.

But around the inner parts of the fiords nature is milder. A large portion of that area consists of lakes, rivers and semi-barrens with meagre soil covered with forests but between are peat deposits and fens on damper soil. These latter are natural h a y f i e l d s rich in grass, principally *Carices*. By clearing the shores of the brooks and lakes in the forested area one can also get superb hay fields for harvesting. Already in 1913 Bryant (107) assumed that the clay and the sand beds in the Hamilton River valley could be successfully cultivated.

The coarse mineral soil, the morainic gravel, is not very profitable for agriculture in Labrador. It contains many big stones and it would be very expensive to remove them. Added to that it deteriorates and forms layers of limonitic hardpan (p. 407), which are very thick and near the surface in Labrador, and which hinders the circulation in the soil. These coarse soils

would moreover require lime and live-stock manure to give them reasonable fertility. Probably in this way even the scrub-covered mineral soil could be transformed into grass-land, e.g. by means of the nutritious wild white clover which makes its appearance after the cattle have been over it. Yet work on this soil would be extremely expensive. The considerable capital required for this process would be more profitably used for market-gardening or potato crops.

It is, however, not necessary to clear and cultivate the good forest lands where peat-land and especially rich fens (p. 398) can be successfully drained and transformed into arable land and used for raising g r e e n f o d d e r. This method of cultivation is fully stabilized and has proved the only one economically defensible when taking up new land in northern Finland and Sweden. By cultivating the fens here, too, the expensive land clearing and the arrangement of intermediary pasture can be avoided. Hay from natural grass-land will later be gradually replaced by the cultivation of h a y a n d g r e e n f o d d e r o n a r a b l e l a n d when financially possible. The yield of greenfodder can be stored either as air-dried or made into silage in the young leafy stage.

In the interior valleys of Newfoundland-Labrador there are extensive fen-land areas; I estimate the cultivable grassy fens at many tens of thousands of acres. But as extensive parts of the country have been photographed from the air there should be no difficulty in making a closer calculation (cf. p. 401).

The natural grass-land and the cultivable fens are not limited to the lower and middle parts of the great river valleys. On the Lake Plateau very extensive areas of grassy fen-land can be seen from the airplane, and along the shores of the brooks the grass grows very high, for instance on the 'otter meadows'. I see no reason why even there fen culture could not be used and green-fodder grown on it. On the Lake Plateau to-day there is not a single settlement. But perhaps there will be.

The results of cultivating easily drained fens have been excellent in Fenno-scandia and it may be at least worth a trial on an inexpensive scale in Labrador — if the problem is not tackled on a bigger scale — to discover its profitability.

It seems thus perfectly possible to keep cattle, goats, sheep and poultry on a paying basis in the inner districts of Labrador south of 55°-lat. It is also possible to be self-sufficient as regards all common vegetables — except perhaps potatoes which are relatively susceptible to frost — every year, and as regards potatoes eight years out of ten (731). The people should therefore be allowed, encouraged and urged to live on the bounties of nature subsidized by their own production and preserving as far as possible. Every inducement

should be given to agriculture and small scale live-stock farming, also the late Dr PADDON concluded (731) after having closely studied the people's life and wants during twenty-six years' residence.

On the other hand nobody will argue that Newfoundland-Labrador is an ideal country in which to start farming. But the trapping-grounds are limited and probably after some years the Canadian policy as to the Indians must be applied also here. Then auxiliary occupations are needed for the white people, trappers and liveyeres. These people want to live in their home country, and propositions for mass emigration would meet with a very cool reception. If no other permanently productive, subsidiary occupation is to be found for the fishermen and trappers, there is the cultivation of land for livestock (cf. 585). A fisherman who has also fields on which he can grow enough hay for his livestock in winter and enough potatoes, turnips and cabbages for his family all the year round will not go hungry or cold whatever happens to the main fishery. There is fresh fish to be had more than half the year, there is game and a supply of wood for building and fuel, LODGE concludes.

It is said to be difficult to impose a farming life on people who have no inherited or traditional flair for farm work. My personal impression from discussions with white Labradoreans is that they understand fairly well the future prospects and that sooner or later a subsidiary occupation is needed for the hunter and the fisherman: 'when the fisherman cannot obtain a living from fishing he must find it in some other activity.' I imagine therefore that to-day only slight encouragement is needed for the introduction of a suitable form of agriculture. Perhaps it suffices to provide the residents with some instruction by competent persons not only in agricultural technique but also in other matters relating to rural industry as a whole. Some trappers themselves pointed out to me that they have never before had contact with agriculture, and experiments in it can be expensive if carried out at their own risk (cf. 918 a). The most competent experts are to be found amongst the residents of northern Finland and northern Sweden, I think.

FARMERS AND FORESTRY.

There are therefore possibilities for mixed farming in Labrador. The total area thus rendered available for colonization would be considerable; but for the development of communications and cooperative efforts it should be centralized in small model groups. This would mean that life would be very far removed from privation.

The establishment of such small farms presupposes however initiative from outside, and the using of favourable circumstances, also some capital and equipment. In the plan for northern Fennoscandia the government secures employment to the settlers so that they can obtain a fair money income in the winter or the summer as day labourers, principally as workers in the f o r e s t i n d u s t r y (preparing booms, skidways, embankments and roads, logging, etc.), if they do not get sufficient work with the private forest firms. Much of such income is invested by the settlers in the holdings which the state has granted them (clearing arable land, construction). Cash contributions are also made by the state in the form of rather large premiums for cleared areas. When the holder of such a small allotment has, for a certain period (20 years), cultivated a certain area and put up all the buildings necessary upon it according to his contract with the state, everything passes automatically into his unrestricted ownership.

The same arrangement could perhaps be made in Labrador. My impression is that in the present state of things the income of the people in North West River and Dove Brook leaves a fairly good surplus which could be used for the gradual preparation of small farm holdings in the way mentioned above. It is evident that the more numerous the occupations on which the rural life of a country is based the less dangerous is the effect of failure in any one of them for rural industry as a whole.

Under these circumstances plans for the colonization of Labrador on a large scale must aim at intimate, reciprocal action between the white inhabitants and the forest industry. In a wider sense the income from the forests must pay the expenses of the state for the administration and provide the cash needed by the settlers. But this cannot be done until the state following a constructive plan in collaboration with the settlers has developed the technical means for a rational forest industry (the construction of permanent roads, booms, embankments, log-houses etc.). Then in return the expense of felling and conveying the timber to the river mouths will fall progressively and a profit-yielding timber industry arise with free competition between the greater and the smaller enterprises. The preparatory work (cf. also p. 801) is to be done by the white inhabitants here as in northern Fennoscandia.

The complex forest work will thus undoubtedly ensure considerable earnings to the liveyeres and trappers as a part-time occupation when fishing and trapping is not in season, and thus solve their employment problem. An annual cut of 200,000 cords has been calculated to employ probably 1500 men, and probably a smaller number in the subsequent operations of hauling

and log-floating (585). If fur or salmon supply fail, and that time will unfortunately come, the trappers and fishers will always have organized labour in the forest industry.

Aerial surveys made by private interests over large areas in the Lake Melville — Hamilton River Valley and their surrounding districts in 1937 showed that Labrador possesses enormous supplies of soft timber, spruce and other conifers. In 1938 it was said that the Bowater-Lloyd group was interested in these forests, but since then nothing has been heard of plans there. As the important consumers of wood show no great enthusiasm for securing concessions or extending their holdings it is fair to assume that either there are difficulties in their rational exploitation or that the resources and the quality are not of such preponderant importance. However, the total stand is unlikely to amount to less than tens of millions of cords (one cord = 128 cub. ft.); cf. p. 408.

Conclusion.

It may seem audacious to put forward the above suggestions for the possible development of this neglected outpost of humanity after a knowledge only acquired during journeys in the country. Yet I have found them supported by people who have lived there for years, and whose opinion is in the main the same as to the necessity of improving the life of many of the inhabitants.

There is nothing in the climate of Labrador to preclude comfort and enjoyment for anyone, said the late Dr Paddon, after his long residence there and his intimate contact with the inhabitants and their problems as well as the resources and forces of nature (731, 824). Apart from the few weeks of diabolical activity on the part of winged pests the period of open navigation can be perfectly delightful, especially west of the fog-zone, which is usually limited to a narrow coastal belt.

One cold fact is that the known resources for a settled population are limited in both number and extent (142 a, 228, 277 a, 288, 290, 291, 302, 370, 376, 585, 682, 678, 679, 814, 864). Newfoundland-Labrador can certainly never be an agricultural exporting country. But it may be expected to produce food from live-stock in far larger amounts than the farmers can consume. It can never be converted into a self-sustaining agricultural country supplying all its own wants. But it can supply a good deal and become as self-supporting as possible in the matter of food-stuffs. And fresh food-stuffs are necessary in order to avoid the common nutritional diseases. Under the present tariff conditions this surplus can maintain a forest-working population in a much

healthier and cheaper way than if food supplies were imported from Canada and the States.

In a country in which potatoes, turnips, cabbages and carrots can be successfully grown, in which cattle and sheep, poultry and goats can be raised, in which there are ample supplies of wood, of which houses can be built and which can serve as fuel in the winter, no human being need go hungry, unclothed or unsheltered except as a result of a failure of human organizing ability. If that community produces fish and small game and furs of a value sufficient to exchange for the clothing, wheat, sugar and tobacco required to supplement the native products, every necessity for a tolerable life is available. Cattle will give milk for the children and in the end meat and boots for the family; sheep will give them wool, skin and meat; poultry will give them eggs and meat (cf. 585). The avitaminoses and consumption will gradually disappear.

When a rational forestry has been started the country will be colonized progressively by a small-holding working population. Then the conditions will be secured for a continuous industrial life in quite another way than at present, when 'the ghosts of the wilds' will scare away the alien people employed in industry.

Then, in time, with the wood-working industries will come the mining and iron industries and perhaps also others founded on cellulose as raw material.

*

Labrador is certainly a region of restricted opportunities. But it is potentially relatively rich in natural resources: soil, timber, iron ore and hydraulic energy, and these will enable the introduction of modern civilization even into the darkest wilderness (cf. 287, 352, 379, 422, 452, 585, 651, 668 a, 669, 720, 731, 835, 840, 842, 844, 845, 919, 1098, 1101). Sooner or later Labrador will come into her own.

* * *

A BIBLIOGRAPHY
OF
LABRADOR
(SPECIALLY NEWFOUNDLAND-LABRADOR)

BIBLIOGRAPHY.

Reasons have already been given in the introduction to this treatise for the pains taken by the author to search out and note down the printed material which, in part or as a whole, more or less directly concerns Labrador, and which is important especially for a knowledge of Newfoundland's share of the great peninsula. That is why the author has undertaken research in many libraries:

The University Library in Helsingfors (where ADOLF ERIK NORDENSKIÖLD's great geographical library is preserved), and

The Scientific Societies' Library in Helsingfors; also, during the author's travels, in

The Royal Library in Stockholm;

The Danish National Museum's Library,

The Royal Library and

The University Library in Copenhagen;

The British Museum's Library,

The Royal Geographical Society's Library,

The Moravian Mission's Library (Fetter Lane) and

The Hudson's Bay Company's Library in London;

The Gosling Memorial Library in St. John's, Newfoundland;

The Dalhousian College Library in Halifax, Nova Scotia;

The Yale University's Library in New Haven, Conn.;

The Harvard University's Library in Cambridge, Mass.;

The Library of Congress,

The Smithsonian Institution's Library and

The National Geographical Society's Library in Washington, D.C. and finally

The American Geographical Society's Library,

The Columbia University's Library,
The Public Library and
The American Museum's for Natural History Library in New York.

Unfortunately, in most cases, there was not time for such a thorough examination as was desirable of the enormous material contained in periodicals, and the author has been obliged to leave practically speaking the whole of the manuscript collections for future research. It can therefore be assumed that there are considerable gaps in the bibliography. The literature which has seen the light since the summer of 1939 has been almost completely inaccessible for the author by reason of the new dis-order produced in Europe by the war.

Yet the very nature of the work implies that a bibliography of the kind and extent here required can hardly ever be complete unless made by a body of specialists, for an all-round man who has really expert knowledge of the literature of all the sections is scarcely to be found in our day. Nor would it have suited my purpose to endeavour here to include all that more or less indirectly concerns Labrador, for then the bibliography alone would have become a book in which probably it would have been impossible to see the trees for the wood. As an illustration of this it may be said that for the details referring to the Vinland voyages alone, Brögger gives a list of some 250 and Josef Fischer of 322 works in their bibliographies. In my list, on the other hand, are included some works which I found quoted in the literature dealing with Labrador, even although I have been unable to trace the originals. For this reason, some such works have only incomplete titles, e.g. Nos 268 a, 385 a, 453 a, 457 a, 770 a. Yet in this way they are rescued from oblivion, for a specialist can easily find them in the great American libraries, and the present bibliography corresponds to the aim to constitute a framework into which supplementary and new literature may be intelligently fitted. In any case, the author ventures to believe that the writings here listed, numbering far more than thousandthreehundred, together with the previous explanatory material and illustrations and the maps listed at the end of the book, will give the reader, even one who has only slight scientific training, fairly satisfactory information regarding the conditions prevailing in Labrador, both at present and in former times. This is necessary, for instance, in planning an expedition to this country in which travelling is so difficult.

Articles dealing with Labrador, and especially Newfoundland—Labrador, are scattered through monographs, journals and magazines, for the most

part published in America and extremely difficult, if not impossible, to discover in the libraries of Europe, and especially in the Northern countries. The whole matter, therefore, cannot be studied exhaustively in Fennoscandia. The author has repeatedly come to the conclusion that one shall not sit in a library armchair in Helsingfors and write about Labrador, but as far as possible do such work in America. If the reader wishes to extend still further his knowledge of the literature concerning Labrador, this can only be done successfully in the great libraries of the United States, with their brilliant organisation and their exceedingly helpful staff, members of which are always ready to rescue even a stranger from being drowned in the catalogues.

The author takes this opportunity of expressing his sincere gratitude to the officials of the libraries listed above, where he has been the object of the most friendly helpfulness while working out the present bibliography. To Dr James B. Childs, Chief of Division in the Congress Library, Washington, D.C., and Dr Carl Björkbom, Librarian at the Royal Library, Stockholm, who have greatly assisted me with literature and films reproducing chapters in books I extend my warmest thanks.

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CARTOGRAPHY.

Contemporaneous maps and charts.

Maps:—

The newest and most complete map for an explorer's practical use within the whole area of Newfoundland—Labrador is

Newfoundland—Labrador. Scale 1 : 1.267,200. Draughted by W. B. Titford. Published by the Department of Natural Resources, Survey Division, St. John's 1937.

This map, however, only indicates positions: it gives a fairly general view of the coastal trend and the river systems, but the morphography is lacking.

A map which is topographic in the strict sense of the word is available only for the northernmost part of the northern triangular peninsula between the Atlantic and Ungava Bay; it is:

Map of Northernmost Labrador. Four sheets of the scale 1 : 100,000 with contour intervals at 50 meters, and

Map of Northernmost Labrador. Scale 1 : 300,000 and contour intervals at every 250 meters.

Both these maps were constructed for the *American Geographical Society* by O. M. Miller, assisted by Walter A. Wood and Charles B. Hitchcock, from oblique aerial pictures, taken by the *Forbes-Grenfell Expedition* of 1931 and the *Forbes Expedition* of 1935 and published in 1938 in the American Geographical Society's Special Publication No. 22. Annexed to these is a diagrammatic chart, showing the distribution of control (ground stations, resected air stations, etc.) in relation to areas covered by the sheets mentioned above.

For the interior, especially the northern part of the 'Lake Plateau', a topographical map may probably be expected as soon as the present extensive iron ore prospecting (261) is concluded and the cartographical material obtained has been compiled.

Charts:—

The British and Canadian up-to-date charts available for the different districts are to be found through the *British Admiralty:* Index to Admiralty Charts of Newfoundland and parts of Labrador and the St. Lawrence, Sheets V. and V 2., London 1929 (cf. bibliogr. 680) to which are added the Admiralty Charts published later: Chart No. 251, Cape Creep to Cape Porcupine, 1936, and Chart No. 265, Approaches to Nain and Port Manvers, 1936.

A series of up-to-date charts of Newfoundland—Labrador is also published by the *U.S.A. Hydrographic Office.*

A map has been made from aero-photographs of the outer coast by the *British War Office,* south-east from a line ten miles east of Nain to a point just east of Davis Inlet (275, p. 133) but the writer has not seen it.

A general survey of the coasts of the Labrador Peninsula is given by

British North America. Hudson Bay and Strait. Published by the [British] Admiralty 1884, Edition 3rd June 1927. Large New corrections 23rd Sept. 1932.

North America: Canada, Hudson Bay and Strait, Second Edition, [Washington], May 1930. Published at the Hydrographic Office under the authority of the Secretary of the Navy. No. 5380. Corrected April 17, 22, 36; or

Sailing directions and descriptions of ports and anchorages are to be obtained from the *British Admiralty's* Newfoundland and Labrador Pilot, Ed. 1929 (680, cf. 977); this information is essentially supplemented by Forbes' Navigational Notes on the Labrador Coast (273, 275) with 16 sketch-maps of courses and harbours. The existing lights and foghorns are to be found in (677). Information about the tides can be obtained from the *Canadian Hydrographic and Map Office's* tables (479). The *U.S. Hydrographic Office*'s monthly Pilot Chart of the North Atlantic Ocean gives reliable information about the ice conditions; (cf. also 204 b).

Older maps and charts.

As regards the older maps and charts of Newfoundland-Labrador, there is every reason to repeat what has already been stated in the preface to the bibliography, that it was scarcely possible to make a nearly complete register of the maps referring to this lonely part of the world by means of my more or less fortuitous visits to some libraries. However, in order to give a general picture of the main development of the cartography, and especially to amplify the notes to be found in the literary sources of the different topics, lists

have been made of the older and the more modern maps which the author found in the libraries mentioned (p. 829 sq.) and in the literature; the first list is in alphabetical order, the second in chronological order.

Two atlases of fundamental value give a preparatory orientation for the older chartography:

Atlas to accompany the case of the Colony of Newfoundland in regard to the Labrador Boundaries (London 1926) and
Labrador Boundary Canadian Atlas (Ottawa 1926).

Valuable information of a chartographic nature also concerning Labrador is to be found in the works of BJØRNBO (83, 84), CORTESÃO (178), DIONNE (225), GANONG (293—301), HARRISSE (409—413, 415), KUNSTMANN (541), LARSEN 553), PACKARD (716), STEVENSON (896), TAYLOR (926), TRAP (959), WINTER 1047) and others.

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—»— See American Geographical Society, 1936.

AMERICAN GEOGRAPHICAL SOCIETY. Labrador, showing the boundary award of 1927. Geogr. Rev., Vol. XVII, p. 657. New York 1927. — **I a.**

—»— Map of the Torngat Region of Northern Labrador. 1 : 500,000. June 1931. — **II.**

—»— Sketch map of northeastern Labrador compiled from data supplied by the American Society. With paper by Ernest C. Abbe. Rhodora, Vol. 38, No. 448. Lancaster, Pa. 1936. — **III.**

—»— Map of northernmost Labrador 1 : 100,000. Constructed at the American Geographical Society from the oblique aerial surveys of the Forbes—Grenfell Expedition of 1931 and the Forbes Expedition of 1935. Geogr. Rev., Vol. XXVI, No. 1. New York 1936. — **IV.**

—»— Map of northernmost Labrador [in six sheets]. Constructed at the American Geographical Society from oblique aerial photographs taken by the Forbes—Grenfell expedition of 1931 and the Forbes expedition of 1935. In charge of survey and mapping operations: O. M. Miller. Scale 1 : 100,000. Annexed to Forbes, Northernmost Labrador . . . 1938. — **V.**

—»— Map of Torngat Region compiled from Sir Wilfred Grenfell's sketch maps, Canadian charts and other data 1931. Cfr. **235**, Fig. 17. — **V a.**

—»— Coast line in the vicinity of Cape Harrison. 1931. Cfr. **235**, Fig. 27. — **V b.**

ANDERSON, F. and OTHERS. Canada, East Coast. Lake Melville surveyed by Captain Anderson . . . 1921. Naval Service of Canada. 1 : 146,666. Ottawa 1922. — **VI.**

ANSPACH, C. A. Charte der Insel Newfoundland und eines Teils der Küste von Labrador. See **15**. Weimar 1821. — **VII.**

D'ANVILLE. Amérique Septentrionale 1746. — **VIII.**

ARROWSMITH, A. Chart of Labrador and Greenland including the Northwest Passages

of Hudson, Frobisher, and Davis, by A. Arrowsmith, Hydrographer to His Majesty London 1809 [additions 1866 in Amer. Geogr. Soc. collection]. — **IX.**

Baker, E. H. B. Approaches to Nain. Hydrographic Rev., Vol. XIII, No. 1. Monaco 1936. — **X.**

Bannerman, Harold M. See Gill, James E.

Bartholomew, J. G. Map showing portion of Labrador claimed by Newfoundland. Annexed to Gosling: Labrador. 1910 (**825**). — **XI.**

—»— Labrador from the most recent surveys. [Hypsography indicated]. Annexed to Gosling: Labrador 1910. — **XII.**

—»— Labrador. Quebec province. In Handy Reference Atlas of the World. Scale about 360 miles = 1 inch. London 1912. **XIII.**

Bartholomew, John. Labrador Boundary. 1 : 10,000,000. Statesman's Year Book. 1928. — **XIV.**

Beauvilliers. Carte depuis la Rivière des Hommes jusqu'à la petite baye des Rochers, Coste de Labrador 1715. — **XV.**

—»— Carte depuis la petite baye des Rochers jusqu' à la baye St. Louis 1715. — **XVI.**

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Bellin, M. Carte de l'Amérique septentrionale Depuis le 28 Degré de Latitude jusqu'au 72. MDCCLV. — **XVIII.**

—»— Suite de la Carte Reduite du Golphe de St. Laurent contenant Les Costes de Labrador depuis Mecantina jusqu'à la Baye des Esquimaux . . . MDCCLIII — **XIX.**

Bozardi, Johannes. Estotilandia et Laboratoris terra. Lovanii 1597. — **XX.**

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				[British Museum Press Marks.]
1	Sanson (N.)	Canada	1656	B.M. 39. e. 2. (32.)
2	Coronelli (M. V.) ..	Do.	1689	B.M. 70620. (4.)
3	Mortier. (P.)	Do.	1693	B.M. 147. d. 25.
4	L'Isle (G. de) ..	Amérique Septentrionale ..	1708	Not in B.M.
5	Do. ..	Do.	[undated]	B.M. 69915. (17.)
6	Do. ..	Do. ..	1700	B.M. 37. f. 13. (60.)
7	Do. ..	Canada	[undated]	B.M. 70615. (12.)
8	Do. ..	Do.	1703	B.M. 37. e. 13. (61.)
9	Senex (J.)	North America	1710	B.M. 148. e. 2. (12.)
10	Bellin (N.)	Amérique Septentrionale ..	1743	B.M. 118. e. 17. (1.)
11	Do.	Nouvelle France	1744	B.M. 118. e.17. (8.)
12	Do.	Amérique Septentrionale ..	1755	B.M. 143. e. 14.
13	Bowen (E.)	North America	1763	B.M. 69915. (85.)

14	Gibson (J.)	America	.. [1763]	B.M. 69810. (101.)
15	Rocque (J.)	North America ..	[undated]	B.M. K118. (32.)
16	Carver (J.)	Quebec	.. 1776	B.M. 31. e. 11. (18.)
17	Arrowsmith (A.) ..	British North America	.. 1814	B.M. 45. f. 7. (46.)
18	Brué (A. H.)	Amérique Septentrionale	.. 1815	B.M. 69915. (36.)
19	Do.	Do	.. 1821	B.M. S.T.A. (1.)
20	Tanner (H. S.) ..	North America ..	.. 1822	B.M. 32. e. 17.
21	Arrowsmith (J.) ..	British North America	.. 1834	B.M. 70410. (10.)
22	Do. ..	North America ..	.. 1839	B.M. 69917. (16.)
23	Brué (A. H.)	Amérique Septentrionale	.. 1840	B.M. 38. f. 14.
24	Arrowsmith (J.) ..	British North America	.. 1842	B.M. 7040. (11.)
25	Keefer (T. C.) ..	North America ..	.. 1855	B.M. 10470. d. 23.
26	Arrowsmith (J.) ..	Do. ..	.. 1857	B.M. N.R. 15.
27	Colton (J. H.) ..	Do. ..	.. 1862	B.M. 69915. (46.)
28	Berghaus (H. C. W.)	World	.. 1863	B.M. 950. (55.)
29	Brué (A. H.)	Amérique Septentrionale	.. 1863	B.M. 69915. (48.)
30	Anon	America	.. 1864	B.M. 69915. (50.)
31	Russell (A.) and Mara (E. A.)	Canada	.. 1871	Not in B.M.
32	Anon	Do.	.. 1872	B.M. 70615. (31.)
32A	G. E. Desbarats ..	Montreal	.. 1873	
33	Baur (C. F.)	America	.. 1873	B.M. 69810. (83.)
34	Johnston (J.) ..	Canada	.. 1874	B.M. 70615. (33.)
35	Do. ..	Do.	.. 1878	B.M. 70619. (11.)
36	Johnson (E. V.) and Edmonds (A. M.)	Do.	.. 1882	Not in B.M.
37	Johnston (W.) and (A. K.)	British North America	.. 1882	B.M. 69917. (110.)
38	Tache (J.) and Genest (F. X.)	Canada	.. 1883	B.M. 70615. (37.)
39	Johnston (J.) ..	Labrador	.. 1890	B.M. 70912. (1.)
40	Stanford	North America ..	.. 1891	B.M. 69915. (68.)
41	Johnson (E. V.) and Edmonds (A. M.)	Canada	.. 1891	B.M. 70619. (5.)
42	Low (A. P.)	Labrador	.. 1896	B.M. C.S. 16.
43	Anon	Canada	.. 1898	B.M. 70615. (44.)
44	Stanford	North America ..	.. 1899	B.M. 69915. (78.)
45	White (J.)	Canada	.. 1908	B.M. 31. a. 59. (1.)
46	Stanford	North America ..	.. 1912	B.M. 69915. (91.)

Index of maps to accompany the counter-case of the Colony of Newfoundland. Labrador Nos 49—52.

49	Hamilton Inlet ..	The Narrows, Lake Melville.
50	Do.	Ivucktoke Inlet.
52	Woody Island.	

Bryant, Henry G. Map of Grand Falls. Cf: **105.** 1894. — **XXII a.**

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—»— St. Augustine River 1912. See Porter, W.

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Cabot, William B, cf. No. 119. 1912. — **XXIVa.**

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Index of maps to accompany the case:

Case maps.

1. Map of Labrador Peninsula. Scale 35 miles to 1 inch. [Ottawa, 1923].
2 a. Map of Eastern Portion of Labrador Peninsula, North-western and North-eastern sheets. Department of Justice, Ottawa, 1923. Scale 12 miles to 1 inch.
2 b. Map of Eastern Portion of Labrador Peninsula. South-western and South-eastern sheets. Department of Justice, Ottawa, 1923. Scale 12 miles to 1 inch.
3. Maps illustrating the Evolution of Labrador:
   A. Part of anonymous Portuguese map of the World. [»King» map], 1502?. After Nordenskiöld.
   B. Part of map of the World. By Salvat de Palestrina. [»Kunstmann Map No 3»], 1504?
   C. Part of map of the World. By Diego Ribero, 1529. After W. Griggs.
   D. Part of map of the World. By Descelière, 1550. After Earl of Crawford.
   E. »Carta da Navegar» of Nicolo and Antonio Zeni [the fictitious »Zeno» map]. Published in Zeno's Commentaries, 1558.
   F. Part of Mercator's »Weltkarte», 1569.
4. Septentrio America. By Jodocus Hondius, Amsterdam. (In Mercator's atlas, Amsterdam, 1630). Scale 660 miles to 1 inch.
5. Amérique Septentrionale. Par N. Sanson. Revuë et changée en plusieurs endroits. Par G. Sanson. Paris, chez Pierre Mariette, 1669. Scale 350 miles to 1 inch.
6. Le Canada ou Partie de la Nouvelle France dans l'Amérique Septentrionale, contenant la Terre de Labrador, la Nouvelle France, etc. Par H. Jaillot, Paris, 1696. Scale 99 miles to 1 inch.
7. A. Coste du Canada depuis Quégasca, Pays des Esquimaux, jusqu'à la Rivière Quesesasquiou, Côte de Labrador. Dessinée sur le Memoire de M. de Courtemanche. Par le Sieur Deshaise, 1704. Scale 4 1/2 leagues to 1 inch.
   B. Nouvelle découverte depuis la Rivière des François qui est à dix lieues au dessous de Monsieur de Courtemanche du coste du Nordest jusqu'à Chechaosquismas et Quessesoikou. Par Pierre Constantin, 1715. Scale 4 leagues to 1 inch.

8. Coste des Eskimaux. By Louis Fornel, 1748. Reproduced from manuscript plan in the Archives du Service Hydrographique de la Marine, Paris. Scale 6 1/2 leagues to 1 inch.
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10. Carte des Possessions Angloises & Françoises du Continent de l'Amérique Septentrionale. Par Jean Palairet. Londres, 1763. Scale 110 miles to 1 inch.
11. A Map of the British Colonies in North America with the roads, distances, limits and extent of the Settlements. Humbly inscribed to the.....Lords Commissioners for Trade and Plantations. By John Mitchell. London, for Jefferys & Faden [1775]. Scale 44 miles to 1 inch.
12. Map of part of Labrador illustrating the proposed Northern Boundary of the Province of Quebec. To accompany the report of the Deputy Minister of the Interior, dated the 29th January, 1896. [Department of the Interior, Ottawa, 1896]. Scale 41 miles to 1 inch.
13. Canada, East Coast, Lake Melville. Published by the Naval Service of Canada. W. J. Stewart, Chief Hydrographer, Ottawa, March, 1922. Scale 2 geographical miles to 1 inch.
14. Slope in the Hamilton, St. Lawrence and Hudson Rivers. [Dept. of Justice, Ottawa, 1924]. Horizontal scale, 6 2/3 miles to 1 inch. Vertical scale 1 foot to 1 inch.
15. Maps and Diagrams, Hamilton River, vicinity of Rigolet. (These maps and diagrams have been inserted in Vol. V [cfr 764], where they form pp. 2323, 2334A, 2342A and 2358B.)

Counter-case maps.

16. Tabula Novæ Franciæ (Père Creuxius]. Anno 1660. Scale 125 miles to 1 inch (approx.)
17. [New France between Trois-Rivières and Mingan. Par le Père P. Laure, 1730 (?)].
18. Carte du Domaine en Canada. Dediée a Monseigneur le Dauphin. Par le Père P. Laure, 23 Aoust, 1731.
19. Süite de la Carte Reduite du Golphe de St. Laurent, contenant les costes de Labrador depuis Mecatina jusqu'à la Baye des Esquimaux le Detroit de Belle-Isle et partie des Costes de l'Isle de Terre Neuve connues sous le nom du Petit Nord. Dréssée au Dépôt des Cartes, Plans et Journaux de la Marine. Paris, chez Mr. Bellin, Ingénieur de la Marine, 1743.
20. Seigniories of Terre Ferme de Mingan, Isles et Islets de Mingan and Isle d'Anticosti. [By James White. Toronto, 1925.] Scale 16 miles to 1 inch.
21. Concessions in Labrador and Newfoundland granted by French. [By James White. Toronto, 1925.] Scale 35 miles to 1 inch.
22. Concessions below Anticosti Island granted by French. [By James White. Toronto, 1925.] Scale 13.8 miles to 1 inch.

Supplementary maps.

23. L'Amérique Septentrionale dressée sur les observations de Mrs. de l'Académie Royale des Sciences & quelques autres. Par G. de l'Isle, géographe. Paris, chez l'auteur, 1700. Scale 300 miles to 1 inch.
24. Carte du Canada ou de la Nouvelle France et des Découvertes qui y ont été faites. Dressée sur plusieurs observations. Par Guillaume de l'Isle. Paris, chez l'auteur,

1703. [With lines indicating British and French claims according to d'Auteuil, 1719.] Scale 160 miles to 1 inch.

24 a. Hudson's Bay and Labrador (Treaty of Utrecht). By Samuel Thornton, 1709. [From manuscript map in Hudson's Bay Company's records.] Scale 76 miles to 1 inch.

25. Carte de la Partie Orientale de la Nouvelle France ou du Canada. Par N. Bellin, Ingénieur de la Marine. [Paris.] 1744. Scale 55 miles to 1 inch.

26. Carte de l'Amérique Septentrionale depuis le 28 degré de latitude jusqu'au 72. Par N. Bellin [Paris], 1755. Scale 110 miles to 1 inch.

27. An accurate map of North America describing and distinguishing the British, Spanish and French Dominions on this great Continent, according to the Definitive Treaty concluded at Paris 10th February, 1763. Also all the West India Islands. By Eman. Bowen, geographer and John Gibson, engraver. London [1673]. (Accompanied the Report of the Lords of Trade, 8 June, 1763). Scale 85 miles to 1 inch.

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29. Chart of Labrador and Greenland, including the North-West Passages of Hudson, Frobishers and Davis. By A. Arrowsmith, Hydrographer to His Majesty. London Published 1 June, 1809. By A. Arrowsmith. Corrections to 1825.

30. British North America. Dedicated to the Honble. Hudson's Bay Co., By J. Arrowsmith. London, 15 February, 1832. Scale 164 miles to 1 inch.

31. Map of North America. By John Arrowsmith. Papers, Hudson's Bay Co. London, 1850. Scale 185 miles to 1 inch.

32. Map of North America. Select Committee on the Hudson's Bay Company. Drawn by J. Arrowsmith. London, J. Arrowsmith, 1857. Scale 185 miles to 1 inch.

33. Aboriginal map of North America denoting the Boundaries and the Locations of various Indian Tribes. Select Committee on the Hudson's Bay Company. By John Arrowsmith, London, 1857. Scale 185 miles to 1 inch.

34. The Dominion of Canada and Northwest and Hudson's Bay Territories. By A. L. Russell. Copp, Clark & Co., lith., Toronto, 1868. Scale 190 miles to 1 inch.

35. Chart No. 1422. North America. East Coast. Labrador. Hydrographic Office, 1871. Published at the Admiralty, 30 March, 1871. Rear-Admiral G. H. Richards, Hydrographer.

36. The Dominion of Canada. A reduction of the map prepared and issued under the direction of the Minister of Railways and Canals (1882). McCorquodale & Co., London. [1886.] Scale 140 miles to 1 inch. [In Canadian Pictures. By the Marquis of Lorne. 1886.]

37. Map of the Dominion of Canada. 1886. Showing the location of some of the Principal Products, etc. Indian and Colonial Exhibition, London, 1886. Department of Agriculture, April, 1886. Canada Bank Note Co., photo-lith., Montreal, 1886. Scale 90 miles to 1 inch.

38. Map showing Provisional Districts of Canada. Department of the Interior. By John Johnston, geographer. Ottawa [1897]. Accompanies Order in Council No. 3388, 18 December, 1897. Scale 230 miles to 1 inch.

39. Map of the Dominion of Canada, 1900. Department of the Interior. By James White. [Ottawa, 1900.] Preliminary edition. Scale 100 miles to 1 inch.

40. North America. From Map 15 in Indexed Atlas of the World, Historical, Descriptive, Statistical. Vol. 1, United States. Rand, McNally & Co., Chicago, 1902. Scale 235 miles to 1 inch.
41. Dominion of Canada. From Plate 124 in XXth Century Citizen's Atlas of the World. 2nd Edition. By John Bartholomew, Edinburgh [1901]. Scale 215 miles to 1 inch.
42. Sketch map of the Labrador Peninsula to illustrate a paper by Dr. Wilfred T. Grenfell, London, Royal Geographical Society. 1911. [In Geographical Journal, April, 1911.] Scale 118 miles to 1 inch.
43. Map of North Atlantic Ocean. Plate 1, Philip's Mercantile Marine Atlas, 3rd Edition, 1908. By George Philip & Son, London. 1908.
44. Map of Arctic Regions, Plate 21, Philip's Mercantile Marine Atlas, 3rd Edition, 1908. By George Philip & Son, London. Scale 540 miles to 1 inch.
45. Inset map in Scarborough's New Map of Newfoundland. Scarborough Company of Canada, Hamilton, Ont. 1916. Scale 86 miles to 1 inch.
46. Standard Map of Dominion of Canada. From Plates 468—469 in Commercial Atlas of America. Rand, McNally & Co., Chicago, 1922. Scale 130 miles to 1 inch.
47. North-eastern Canada. Plate 83, Times Survey Atlas of the World. By J. G. Bartholomew. The Times, London, 1922. Scale 79 miles to 1 inch.
48. Dominion of Canada with Newfoundland—Commercial Development. Plates 103—104 in Philip's Chamber of Commerce Atlas, 1st edition, 1925. George Philip & Son, London [1925]. Scale 160 miles to 1 inch.
49. Ontario—Manitoba Boundary. [Department of Justice, Ottawa, 1926.] Scale 50 miles to 1 inch.
50. South-eastern Alaska and part of British Columbia, showing Award of Alaska Boundary Tribunal, 20 October, 1903. [Department of Justice, Ottawa, 1926.] Scale 17 miles to 1 inch.
51. Boundary Claims, 1700—1763, in the Labrador Peninsula and in North-eastern Ontario and Manitoba. By James White [Ottawa, 1923]. Scale 70 miles to 1 inch.
52. Coast of Labrador. By John Arrowsmith. Scale 53 miles to 1 inch. [Map No. III in The Colonial Church Atlas. Third Edition. Society for Promoting Christian Knowledge. London, 1853.]

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Constantin. See Courtemanche.

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—»— Nouelle découverte depuis la rivierre des francois [Pinwari. R.] qui est à dix lieües

au dessous de Monsieur de Courtemanche du Côsté du Nord'est iusqu'à Chechasosquimas et Quessesoikou [Hamilton River], faite par Pierre Constantin En l'année 1715. — **XXXIV.**

CURTIS, ROGER. A chart of part of the Country of Labrador, taken by order of Commodore Shuldham in a Tour up the Coast in the Year 1773. Scale 1 : 500,000. — **XXXV.**

DALY, REGINALD A. Sketch Map of Nachvak Bay. See **200.** Cambridge 1902. — **XXXV a.**

DECOÜAGNE. Carte du Canada tirée sur un très grand nombre de memoires des plus recents augmentée et corrigée sur touttes celles qui ont été faittes avant 1711. Presentée a Monseigneur le Comte de Ponchartrain, commandeur des ordres du Roy, secretaire et ministre destat par son très humble et très obedient seviteur Decoüagne. — **XXXVI.**

DEE, JOHN. Atlantidis, vulgariter Indiae Occidentalis nominatae, emendatior descriptio quam adhuc est divulgata. 1580. See E. G. R. Taylor. — **XXXVI a.**

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[DE] l'ISLE, G. DE. L'Amérique Septentrionale Dressée sur les Observations de Mrs de l'Académie Royale des Sciences & quelques autres, & sur les Memoires les plus recens. Paris 1700. — **XXXVIII.**

DEL' ISLE, GUILLAUME. Carte du Canada ou de la Nouvelle France at des Découvertes qui y ont été faites. Paris 1703. — **XXXIX.**

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1. **V. Tanner:** Outlines of the Geography, Life and Customs of Newfoundland-Labrador (The eastern part of the Labrador peninsula). Based upon observations made during »The Finland Labrador Expedition» in 1937 and »The Tanner Labrador Expedition» in 1939 and upon information available in the literature and cartography ..... 1—907

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